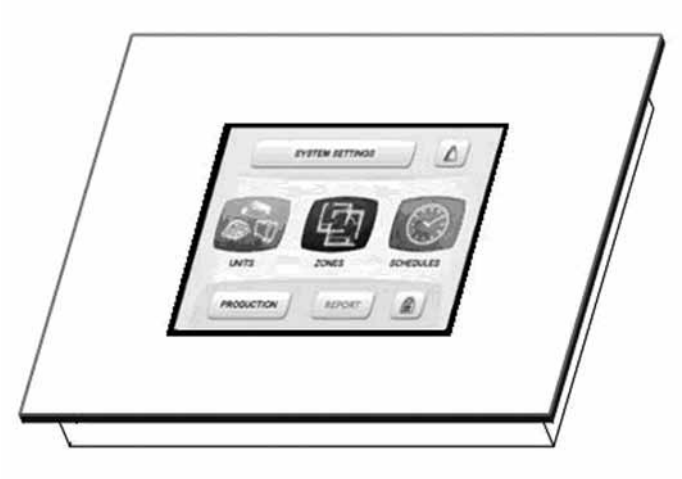
Carrier®

THE HYDRONIC SOLUTION Aquasmart EVOLUTION

New System Manager



TOUCH Pilot

Installation, operation and maintenance instructions

LLOYD'S REGISTER QUALITY ASSURANCE
ISO9001·ISO14001

Quality and Environment Management Systems Approval

CONTENTS

1 - SAFETY CONSIDERATIONS 5
1.1 - General 5
1.2 - Precautions against electrocution 5
1.3 - General installation recommendations 5
1.4 - Conformity 5

2 - AQUASMART SYSTEM DESCRIPTION 6
2.1 - System architecture 7

3 - PHYSICAL CHARACTERISTICS OF THE NEW SYSTEM MANAGER 9
3.1 - Dimensions (in mm) 9
3.2 - Power supply 9
3.3 - Storage 9
3.4 - Operation 9
3.5 - LCD screen 9
3.6 - Clock 9
3.7 - Connections 9
3.8 - Installation 10

4 - USE OF THE NSM 10
4.1 - Information display 10
4.2 - Use of the touch screen 10
4.3 - Use of the web interface 10

5 - CONNECT THE NSM 12
5.1 - Register the terminal units 12
5.2 - Connect the primary and secondary buses and power supply of the NSM 12

6 - USE OF THE NSM 12
6.1 - Screen architecture 12
6.2 - System/configuration assistant start-up 13
6.3 - Back-up of the NSM configuration 19
6.4 - Loading a back-up configuration 19

7 - WELCOME SCREEN 19

8 - ACCESS MODE 20
8.1 - Guest mode (screen H) 21
8.2 - Advanced/Service mode 21
8.3 - Reboot of the NSM application (screen H) 21
8.4 - Display of the NSM software version (screen H) 21

9 - NSM INTERFACE CONFIGURATION (SCREEN A) 21
9.1 - Modify the language and the measurement system (screen A-1) 22
9.2 - Find/modify information about the operating site (screen A-2) 22
9.3 - Modification or adding a password or modification of the time to automatically return to the guest mode (screen A-3). 22
9.4 - Modify date and time (screen A-4) 23
9.5 - Summer time control (screen A-4-1) 23
9.6 - Configure access to the e-mail server (screen A-5) 23
9.7 - Aquasmart system management (screen A-6, Service mode only) 24

10 - CHILLER/HEAT PUMP MANAGEMENT (SCREEN F) 30
10.1 - System 30
10.2 - Find the chiller/heat pump status (screen F-2) 37
10.3 - Find the boiler status (screen F-3) 40
10.4 - Find the status of the air handling unit (screen F-4) 41

11 - ZONE MANAGEMENT (SCREEN D) 45
11.1 - Create a zone (screen D-1) 46
11.2 - Delete a zone (screen D-2) 46
11.3 - Copy setpoint parameters from one zone to another zone (screen D-4) 47
11.4 - Rename a zone (screen D-3) 47
11.5 - Change the operating mode of a zone 47
11.6 - Modification of a zone temperature setpoint (screen D-6) 48
11.7 - Find/modify the members in a zone (screen D-7) 49

12 - TIME SCHEDULE MANAGEMENT (SCREEN E) 49
12.1 - Add a time schedule (Screen E-1) 50
12.2 - Delete a time schedule 51
12.3 - Copy the parameters of a time schedule to another time schedule (screen E-4) 51
12.4 - Rename or modify a time schedule type (screen E-3) 52
12.5 - Find/modify the events of a time schedule (screen E-6) 52
12.6 - Find and modify the members linked to a time schedule (screen E-7) 52

13 - MONITORING THE TERMINAL UNITS (SCREEN C) 53
13.1 - Rename a unit (screen C-1) 53
13.2 - Copy the parameters of a unit (screen C-2) 53
13.3 - Change the occupancy mode of a unit (C-3) 54
13.4 - Modify a unit setpoint (screen C-4) 54
13.5 - Find the status of a unit (screen C-5) 55
13.6 - Find/modify the basic unit parameters 56
13.7 - Terminal unit operating history 57
13.8 - Access to the advanced unit parameters (screen C-5-2-1) 58

14 - ENERGY MANAGEMENT (SCREEN G) 62
14.1 - Configuration of the energy meter inputs of the NSM 62
14.2 - Displaying the energy meter values of the NSM 63
14.3 - Energy management 64
14.4 - Total consumption for the current year 64
14.5 - Consumption history 64

15 - ALARM DISPLAY (SCREEN B) 66
15.1 - Terminal unit alarms 66
15.2 - Chiller/heat pump and CCN AHU alarms 67

16 - BACNET 67
16.1 - Transform a non-BACnet NSM to a BACnet NSM 67
16.2 - BACnet architecture 67
16.3 - BACnet objects of the Aquasmart system 68
16.4 - Note for CCN equipment types 30RB, 30RBS, 30TH, 30WG, 30XA, 30XAS, 30XW, 39SQ 71
16.5 - BACnet Protocol Implementation Conformance Statement (PICS) 77

17 - NSM INTERFACE/CCN TABLES 79
17.1 - Table: SMSTATUS, PIC TYPE TABLE: 11H, example 1 79
17.2 - Table: SMDIDO, PIC TYPE TABLE: 11H, example 2 79
17.3 - Table: NTCMAINT, PIC TYPE TABLE: 15H example 1, and Table: NTC001 to NTC128, PIC TYPE TABLE: 641H, example 1 to 128 79
17.4 - Table: AHUMAINT, PIC TYPE TABLE: 15H example 2, and Table: AHU024 to AHU031, PIC TYPE TABLE: 642H, example 1 to 8 79

18 - COLOUR TOUCH SCREEN INTERFACE PARAMETER SETTING 80
18.1 - Main configuration menu 80
18.2 - Find and modify the NSM IP address 80
18.3 - Configuration of the web connection 80
18.4 - System configuration and buzzer 81
18.5 - Display configuration (contrast, screensaver, calibration) 82
18.6 - "Keyboard" menu 82
18.7 - Password for access to the touch screen configuration 83

19 - NSM UPDATING 83
18.8 - Languages available for the touch screen configuration 83

20 - TROUBLESHOOTING OF OPERATING PROBLEMS 84
20.1 - Material problems 84
20.2 - Problems with the use of the web interface 84

LIST OF ABBREVIATIONS

AI	Analogue input
AHU	Air handling unit
AO	Analogue output
AWG	American Wire Gauge, American wire size standard. The equivalent cross-sections given in mm^2 are approximate.
BMS	Building Management System
BP	Primary bus
BS	Secondary bus
C/O	Changeover (reversible)
CCN	Carrier Comfort Network (proprietary Carrier protocol)
CRC 2	Carrier Room Controller 2 user interface
DI	Digital input or on/off input
DO	Digital output or on/off output
EC	Electronically commutated
IEC	International Electrical Commission
IR 2	Infrared remote control user interface 2
LED	Light-emitting diode
NC	Normally closed (contact)
NO	Normally open (contact)
NSM	New System Manager
NTC	New Terminal Controller
OAT	Outside air temperature
SUI	Simplified User Interface
ZUI 2	Zone User Interface 2

NOTE ABOUT THIS DOCUMENT

The illustrations included in this document are for information only and not contractually binding. Carrier reserves the right to modify the design at any time without previous notice.

The screen shots illustrate the use of the New System Manager in the English language. If there is any doubt about the description of a control step, numbers allow the user to refer to the zone associated with the screen.

Note for BACnet:
It is strongly recommended to have BACnet training before configuring/using this function.

1 - SAFETY CONSIDERATIONS

1.1 - General

Installation, commissioning and servicing of the various components of the Aquasmart system can be dangerous unless certain aspects of the installation, such as the presence of mains electricity and hot or chilled water in the air conditioning equipment, are taken into account.

Only specially trained and qualified technicians and installers who have been fully trained on the product concerned are authorised to install, commission and service this equipment.

During servicing work, it is essential to apply all recommendations and instructions given in service leaflets, on labels or in the instructions delivered with the equipment, and to comply with any other relevant instructions.

- Comply with all safety rules and regulations currently in force.
- Wear eye protectors and work gloves.
- Take care when moving or positioning equipment.

1.2 - Precautions against electrocution

It is strongly recommended to disconnect the complete power supply before any intervention. Disconnect the main power supply with appropriate disconnect devices.

Only personnel qualified to the level recommended in standard IEC 60364 (International Electrotechnical Commission) and trained to do this may have access to electrical components. In particular it is obligatory to disconnect all electrical power supplies to the unit and its accessories before carrying out any work. Disconnect the mains power using the disconnect device (not supplied by Carrier).

1.3 - General installation recommendations

IMPORTANT: The terminal controllers of the chiller(s)/ heat pump(s) and of the air handling unit, must have an isolating device upstream. These safety devices shall be sized and installed in accordance with recommendation IEC 60364. These devices are not supplied by Carrier.

In general terms the following rules must be applied:

- The power disconnection device must be clearly labelled to identify which items of equipment are connected to it.
- Each unit must also be clearly labelled to identify and locate the power disconnection device to which it is connected.
- The wiring of the components that make up the Aquasmart system and of the communication buses must be carried out in accordance with the latest rules and regulations by professional installers.
- The Aquasmart system and all its components must be installed in an environment, which conforms to the applicable environmental characteristics.
- To avoid interference with the connection cables:
  - Keep communication wiring away from power cables and avoid using the same cable run (300 mm maximum, common with the 230 V a.c. cable)
  - Do not pass low-voltage cables through loops in the power cables.
  - Use the type of cable recommended by Carrier (see chapter “System architecture”).

IMPORTANT: The components that make up the Aquasmart system include electronic devices. These may generate or be damaged by electromagnetic interference unless they are installed and used in accordance with these instructions. The various components conform to the main requirements for electromagnetic compatibility in residential and industrial areas.

1.4 - Conformity

The New System Manager has been declared to be in conformity with the following European directives:

- Electromagnetic compatibility: 2004/108/EC

With reference to the applicable sections of the following standards:

- IEC 61000-6-1 Immunity for residential, commercial and light-industrial environments
- IEC 61000-6-2 Immunity for industrial environments
- IEC 61000-6-3 Emission standard for residential, commercial and light-industrial environments
- IEC 61000-6-4 Emission standard for industrial environments
- IEC 61131-2 Programmable controllers – Part 2: Equipment requirements and tests

The System Manager also complies with the follwoing European directives:

- WEEE: Waste Electrical and Electronic Equipment 20021961EC and ROHS: Restriction of Hazardous Substances 2002195lEC.

2 - AQUASMART SYSTEM DESCRIPTION

The Aquasmart system is designed to control the comfort in residential and light-commercial buildings as well as office suites, hotels and hospitals. The system is characterised by its capacity to control the operation of the various components based on the requirements of each user on the one hand and the building occupation time schedules on the other hand.

It was especially developed for hydronic systems and permits optimising the operation of each air conditioning equipment component, while giving each user the freedom to modify the setpoints, fan speed and operating mode, either Occupied or unoccupied (Eco). Each system component includes all factory-installed and tested control elements, ready to be connected to the water and power supply of the application.

The principal system components are:
- Units for cold water production. They may be reversible for hot water production or connected to a boiler. The Carrier units are equipped with the communicating electronic Pro-Dialog control.
- Terminal fan coil units, cassettes, ductable units or wall-mounted units. These terminal units are factory-equipped with a communicating electronic control called New Terminal Controller (NTC). A user interface to allow adjusting the comfort parameters is also available. For more information please refer to the installation manuals for the terminal units.
- Air handling unit(s) for fresh air intake.

The device that controls all the equipment is the New System Manager (NSM). The user can access it directly via a colour touch screen interface or via a web browser.

The supported hydronic system types are:
- 2 pipes,
- 2 pipes changeover
- 2 pipes changeover + 2 wires
- 4 pipes,
- 2 pipes + 2 pipes.

Please refer to the Aquasmart Application Guide.

The New System Manager (NSM) controls the operation of the equipment via two communication buses:
- the primary bus that links it to the chiller/heat pump/ air handling unit),
- the secondary bus that links it to each terminal unit controller (NTC).

NOTE: Chillers/heat pumps not supplied by Carrier are controlled by on/off outputs.

The NSM determines the terminal units that require cooling and those that require heating. If the demand is above a configurable threshold it selects the mode (this calculation takes place every 30 seconds). It then commands the units that can satisfy the demand. The terminal units cannot satisfy their own demand and act to ensure that they cannot cause any discomfort (water valve closure and fan speed reduction).

Each piece of equipment (NTC, chiller/heat pump) continues to ensure its own operation:

The NSM controls the changeover from occupied mode to unoccupied mode (Eco mode) and vice-versa, based on the individually programmable time schedule grids each zone.

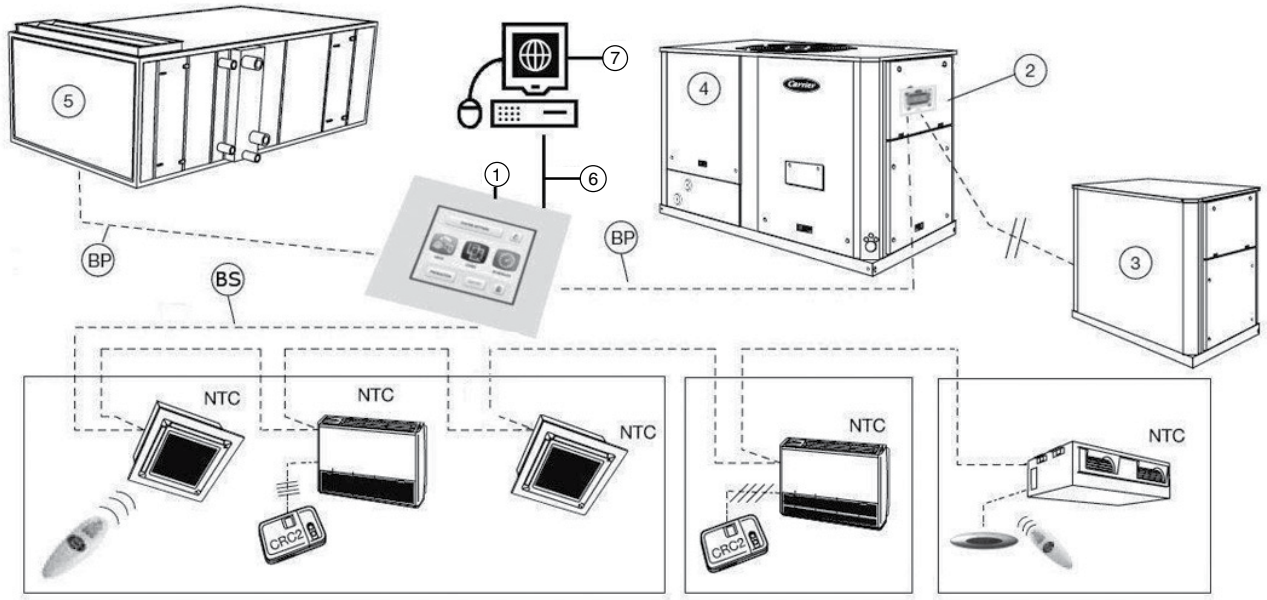
A user can change the mode from his user interface from the unoccupied mode to the occupied mode or vice versa.

The NSM is designed for easy and user-friendly operation and:
- to configure the system,
- to set the zone parameters,
- to display equipment operation.

To track and control the energy consumption three energy meters with pulse outputs can beconnected to the NSM.

As an option, the NSM offers a BACnet IP interface that gives access to the predefined NTC, chiller/heat pump and air handling unit objects.

IMPORTANT: The NSM is not compatible with the Carrier TC (Terminal Controller) or the HDB (Hydronic Dual Board).



Legend
BP Primary bus
BS Secondary bus
1 New System Manager (NSM)
2 Pro-Dialog+ interface
3 Boiler
4 Carrier chiller/heat pump
5 Carrier air handling unit
6 Ethernet connection
7 Web browser

2.1 - System architecture

2.1.1 - Aquasmart system structure

The system architecture includes three communication levels:

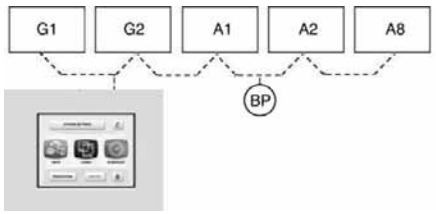
- The so-called "primary" bus to which the NSM and the chiller/heat pump and air handling unit are connected. The communication protocol used is the CCN (Carrier Comfort Network) protocol.
- The so-called "secondary bus" used by the NSM communicates with the terminal units, and terminal units equipped with the NTC also use this bus to communicate with each other, if they are in a master/slave configuration. This bus supports up to 128 terminal units. The communication protocol used is the CCN protocol.
- The so-called "local" bus that allows the NTC to communicate with its communicating user interface.

2.1.2 - Primary bus (NSM and CCN network)

The primary bus supports up to 32 CCN network elements, including chillers/heat pumps and the Carrier air handling unit(s) equipped with Pro-Dialog control. These units can operate in master/slave mode.

The default CCN address (bus, element) of the NSM is 0.65. Its communication speed is 9600 baud.

Primary bus



Legend
G1 Master chiller/heat pump
G2 Slave chiller/heat pump
BP Primary bus
A1 Air handling unit 1
A2 Air handling unit 2
A3 Air handling unit 3

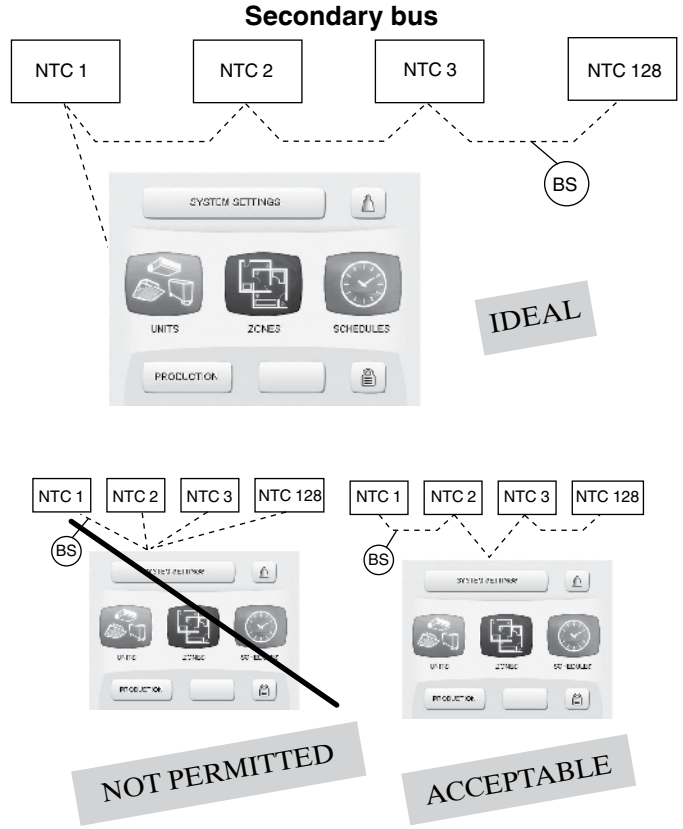
Characteristics

- Communication support type RS485 (3 wires + shielding).
- Recommended cable type: 3 wires or 2 twisted pairs Belden ref. 9842. The Belden cables of series 8332, 9829, 8102, 8302 can also be used.
- Maximum length of the primary bus = 500 m, without Carrier amplifier. These need to be installed if the segment length is over 500 m.
- Communication protocol on the bus: Carrier Comfort Network (CCN).

2.1.3 - Secondary bus

A secondary bus supports a maximum of 129 connection nodes: the System Manager and up to 128 terminal units equipped with the Terminal Controller (NTC).

The CCN address (bus, element) of the NSM on the secondary bus is 65,239 (not modifiable). Its communication speed is 9600 baud.



Legend

NTC Terminal units with NTC (1 to 128)
BS Secondary bus

Characteristics

- Same as for the primary bus.

2.1.4 - Connection recommendations for the primary and secondary bus

The units are connected by a single bus cable that is installed in cascade between the units. The number of units connected on a bus is limited (see previous chapters).

IMPORTANT:

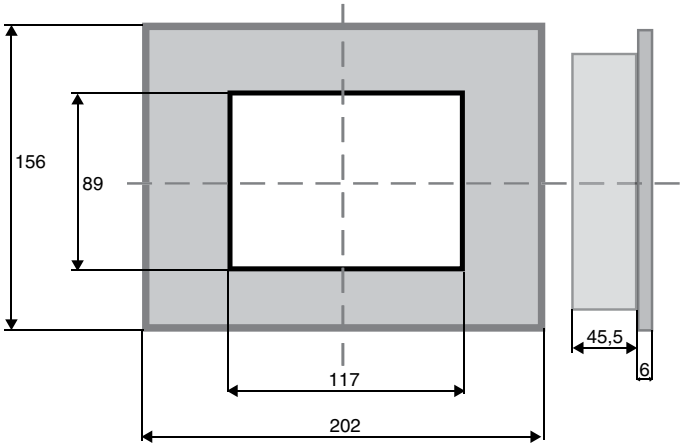
Instructions to follow:

- ***The bend radius must be higher than 20 times the cable diameter.***
- ***Avoid looping of the earth cable. Place the cable on metallic structures.***
- ***The controller connection to the bus can be made with a cable extension, if required. All extensions must be as short as possible, and must never exceed 1.5 m.***
- ***Ensure that the earth potential is the same everywhere.***
- ***Ensure that the cable shielding continuity is guaranteed along its whole length.***
- ***Connect one of the ends of the bus cable shielding (only one) to the earth. The distance between the shielding and earth must be as short as possible. If the earth potential between the controllers is the same everywhere, it is better to connect both ends of the bus cable shielding.***
- ***It is important to connect the "+" and "-" terminals of the bus cable on the same twisted cable pair.***
- ***To avoid any reflection in long cables, it is recommended to add an end-of-line impedance at the ends of the bus. The NSM includes two internal end-of-line impedances (one per bus). Two accessible switches allow adding or removing (default position) the impedances. If the network only has a short distance, the end-of-line impedances can be left out without effect on data transmissions.***

3 - PHYSICAL CHARACTERISTICS OF THE NEW SYSTEM MANAGER

3.1 - Dimensions (in mm)

Front view



3.2 - Power supply

The NSM must have a power supply of 24 V d.c. ± 20%, max. 500 mA. The metal part of the case must be connected to earth.

A power supply of 230 V a.c./24 V d.c./20 VA can be supplied as an accessory.
Reference: 33ASM-04 power supply, moulded.
Reference: 33ASM-05 power supply installed on a DIN rail.

The ferrite supplied with the NSM must be positioned on the 24 V d.c. power supply cable, as close as possible to the NSM.

3.3 - Storage

- Temperature: -25°C to 70°C.
- Relative humidity: 10 to 98% without condensation.
- Shocks (transport): complies with standard IEC 60068-2-32, mechanical shock resistance test after a free fall from 300 mm height, repeated five times (product weight <10 kg).

3.4 - Operation

The NSM can be installed anywhere, as long as it is protected against external elements.

Please observe the following installation precautions:
- Avoid exposing the unit to shocks or spilled liquids.
- Remove the unit from any source of electromagnetic interference.
- Protect the unit from the sun and excessive heat sources.
- Temperature: 0°C à 50°C selon IEC 60068-2-14.
- Relative humidity: ≤ 50%, without condensation.
- Shocks: 15 G at any level for 11 ms.
- Vibration: 5 to 8.4 Hz, 3.5 mm peak movement (IEC 60068-2-6) and 8.4 to 150 Hz, 1.0 g peak acceleration (IEC 60068-2-27).
- Protection index: IP65 (front face of the unit).
- Pollution level 2.
- Installation category II.

3.5 - LCD screen

The NSM is equipped with an LCD TFT colour screen. The size is 5.7" and the resolution 640 points x 480 points (VGA).

This is a touch screen. It can be pressed with a finger or with a suitable pen. Pointed or cutting tools should not be used (e.g. screwdrivers).

NOTES: Remove the two transparent protection films.

Cleaning: Use only products that are suitable for LCD screens. Do not use detergents that contain abrasives, as they could impair the legibility of the screen texts or damage the touch screen.

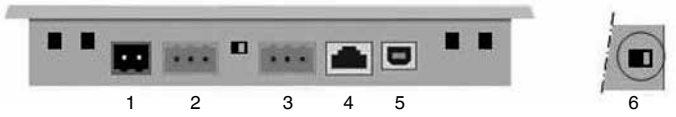
3.6 - Clock

The NSM is equipped with a real-time clock that continues to operate for 100 hours when the NSM has no power supply (room temperature reference is 25°C).

3.7 - Connections

The connections are detailed on the rear face of the module. Below the view from below and the side view of the New System Manager.

Connections (view from below)



1 24 V d.c. GND power supply
2 Secondary bus (NTC) +0-
3 Primary bus (chiller/heat pump) +0-
4 Ethernet
5 USB
6 Primary bus end-of-line impedance switch closed ← → open (default is open) (switch on the right-hand side)

Connections (side view)

1 Connection screw to earth the NSM
2 Inputs (from left to right)

meter 3	meter 2	meter1	digital 3	digital 2	digital 1
GND	GND	GND	GND	GND	GND

3 Digital outputs (D03, D02, D01)

Connections (side view)

1 Secondary bus end-of-line impedance switch closed ← → open (default is open) (switch on the right-hand side)

3.7.1 - RS485 ports

The two RS485 ports correspond to the two CCN communication buses (primary bus and secondary bus). Between the two RS485 ports there is a switch that allows switching off the "RS485 Primary bus" line (heat pump/chiller) to prevent any signal reflection.

Front view:
- Switch to the left = closes the 150-ohm line (closed)
- Switch to the right = no closure (open)

3.7.2 - Ethernet RJ45 port

The Ethernet RJ45 port permits connection of the module to the Ethernet network to access the NSM via a web browser and/or an optional BACnet IP building control interface.

An uncrossed CAT5 cable is recommended for the connection to the building network or a point-to-point connection to a computer.

3.7.3 - USB port

This port is only used for update and save operations of the NSM database. Please refer to the Carrier S-Service update tool. It is not used for other application types.

3.7.4 - Relay outputs

The relay outputs allow control of the following equipment: a non-CCN chiller/heat pump, a boiler or an air handling unit. They can be connected to a time schedule grid to control a piece of equipment based on the occupancy mode. The relay outputs are voltage-free. Relay characteristics: 24 V a.c., 1 A.

3.7.5 - Digital inputs

The digital inputs are connected to dry contacts. They allow passing system status information to the NSM (alarms, shut-down, loadshed, frost protection).

3.7.6 - Meter inputs

The meter inputs are connected to the pulse outputs of the energy meters in accordance with standard IEC 62053-031. They supply the energy consumptions to the NSM.

3.8 - Installation

3.8.1 - Flush fitting in a control box door

This installation type does not require any special kit.
- Make an opening with the following dimensions: height = 142 mm, length = 189 mm.
- Slide the module in the opening cut out.
- Ensure that the ventilation slots (at the top and both sides of the module) are not obstructed an allow free air circulation.
- Install the four plastic fixing consoles (two at the top of the module and two at the bottom).

  NOTE: Use a 2.5 mm hexagonal spanner for the screws.

- Tighten the screws in the consoles so that they can always be locked to the NSM, without obstructing the panel.
- Lock them to the module, and then tighten the screws until they touch the panel.
- Tighten the screws in the normal way to a maximum of 0.4 N·m.

3.8.2 - Flush fitted in a wall

This installation type requires a special kit, reference number 33ASM-03. The installation instructions are supplied with the kit.

3.8.3 - Surface-mounted on a wall

This installation type requires a special kit for wall-mounting, reference number 33ASM-02. The installation instructions are supplied with the kit.

4 - USE OF THE NSM

Access to the data in the NSM is possible:
- via a colour touch screen interface,
- via a PC équipped with a web browser with Java platform.
- via an iPad/iPhone, using the Carrier application available from the Apple store

4.1 - Information display

No matter whether the colour LCD screen is used or the web interface, the background and the format are the same. The information and the actions are presented in text or graphic format. Please refer to sheet 1 to find the explanation for the icons and buttons.

4.2 - Use of the touch screen

By pressing the buttons for the zones, text zones, list elements on the touch screen it is possible to interact with the NSM.

4.3 - Use of the web interface

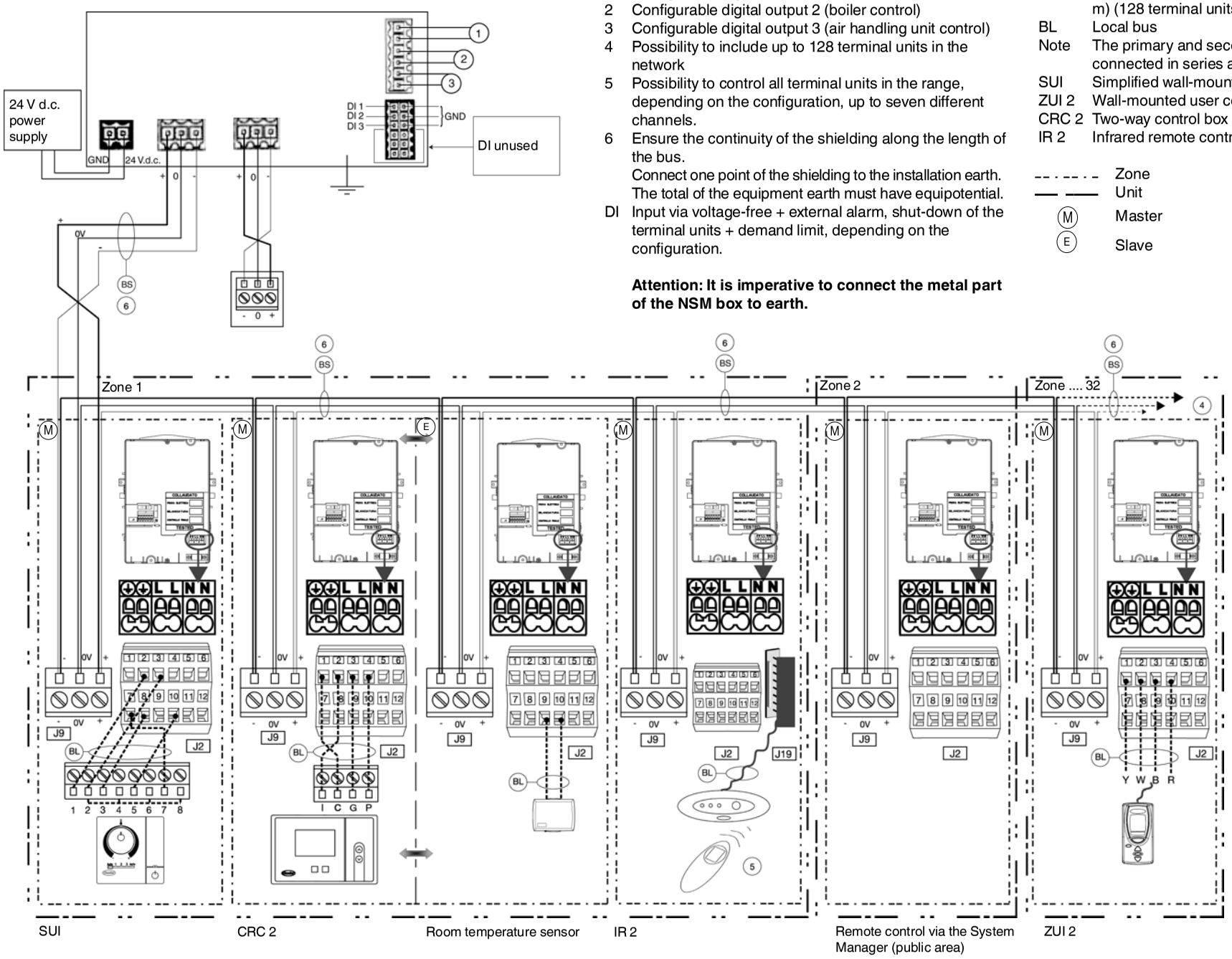
Access to the NSM is possible with a web browser and entering the IP address of the NSM.

Minimum web browser configuration:
- Microsoft Internet Explorer version 6 or Mozilla Firefox version 3.5.2 or higher (in the advanced connection options add the NSM IP address to the address list. Do not use a proxy server).
- Java platform version 6 or higher (in the control panel untick the option that allows storing temporary internet files and use a direct connection).

For more information on the web browser and Java platform configuration refer to the troubleshooting section of this document and contact your network administrator.

NOTE: It is normal to have to wait several minutes (page loading) before the main menu is displayed.

Only one internet user is allowed at a time. When the user disconnects, another user will be authorised to connect five minutes later. Until the delay has expired a page indicates to the user that too many users are connected.



Legend

1 Configurable digital output 1
2 Configurable digital output 2 (boiler control)
3 Configurable digital output 3 (air handling unit control)
4 Possibility to include up to 128 terminal units in the network
5 Possibility to control all terminal units in the range, depending on the configuration, up to seven different channels.
6 Ensure the continuity of the shielding along the length of the bus.
Connect one point of the shielding to the installation earth.
The total of the equipment earth must have equipotential.

DI Input via voltage-free + external alarm, shut-down of the terminal units + demand limit, depending on the configuration.

Attention: It is imperative to connect the metal part of the NSM box to earth.

BP Primary bus (3 x 0.5 mm² + shielding - max. 330 m)
BS Secondary bus (3 x 0.5 mm² + shielding - max. 330 m) (128 terminal units maximum)
BL Local bus
Note The primary and secondary buses must be connected in series and not star-connected.
SUI Simplified wall-mounted thermostat
ZUI 2 Wall-mounted user control box
CRC 2 Two-way control box with numerical display
IR 2 Infrared remote control 2

Zone
Unit
(M) Master
(E) Slave

5 - CONNECT THE NSM

ATTENTION: Any installation must always be carried out with the power to the unit disconnected.

5.1 - Register the terminal units

Attach the self-adhesive labels, taken from the terminal units and showing the serial number, to the site plan (check list).

5.2 - Connect the primary and secondary buses and power supply of the NSM

Cable material required (supplied by the installer):
- 1 small screwdriver (type AC 3.5).
- Cables type 2 x 1 mm^2 (18 AWG) for 24 V d.c. power supply

Recommended connection sequence:
- Use one of the two orange three-point connectors supplied to connect the primary bus to the NSM.
- Use the second orange three-point connector supplied to connect the secondary bus to the NSM.
- Use the black two-point connector supplied to connect the power supply of the NSM.
- For the typical wiring diagram refer to the previous page.

6 - USE OF THE NSM

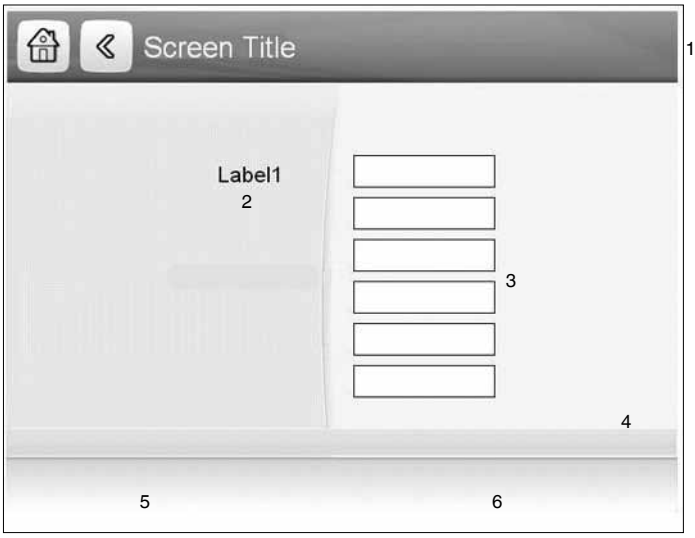
6.1 - Screen architecture

6.1.1 - Configuration assistant screen

Legend
1 Screen title
2 Current step
3 Moving from one step to the next

For the menu architecture please refer to sheet 2.

6.1.2 - Configuration and status screens



Legend
1 Screen title
2 Description
3 Editable fields
4 Message area
5 Action button area
6 Navigation button area

Use of the touch screen - editable field
To enter an alphanumeric value the user needs to press on the editable field and a touch keyboard appears on the screen. The new value is validated by pressing the OK key on the keyboard.

IMPORTANT: The system uses the decimal point as the separator.

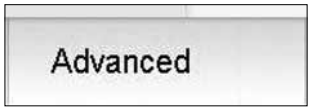
Use of an internet browser - editable field
To enter an alphanumeric value the user needs to click on the editable field with the computer mouse. Text modifications in the field can be made on the computer keyboard.

To validate a modification press the Enter/OK key on the keyboard or click in an empty zone on the screen.

IMPORTANT: The system uses the decimal point as the separator.

Action button zone
Press/click the "Edit" button to authorise the modification of the editable fields. The "Save" and "Cancel" buttons are now shown in place of the "Edit" button.

If the "Advanced" button is shown, the user can access the advanced functions (Advanced mode).



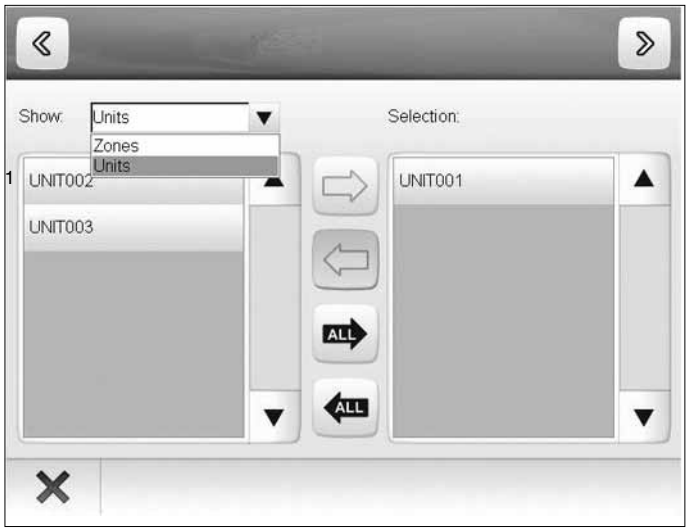
Navigation button zone
Press/click the left-hand button to show the previous unit.

Press/click the right-hand button to show the next unit.

Press/click the Up button to show the previous page of parameters for the selected unit.

Press/click the Down button to show the next page of parameters for the selected unit.

6.1.3 - Multiple selection screen (double list)



Legend
1 Scroll-down list

The scroll-down list acts as a filter. With this list you can display the terminal units or the zones that contain the terminal units (left-hand list).

The selected units or zones are shown in the right-hand column.

Press/click the "ALL" button to show the scroll-down list of all units or zones in the selection list.

To select unit by unit or zone by zone
Press/click on the unit or zone name to select it. The selected unit or zone is now highlighted.

With the arrow buttons pointing to the right the user can move the selected units to the selection list, either one by one or all.

With the Up and Down arrows on either side of the lists the user can change the page. Selections made on previous pages are kept.

With the arrow keys pointing to the left the user can move the selected units from the selection list to the other list (deselection), either one by one or all.

6.2 - System/configuration assistant start-up

Check the following points and refer to the list of check points before continuing with the start-up:

Checks	Yes/no
The primary and secondary buses are connected to the NSM	
All terminal unit labels have been attached to the installation site plan so that they can be located easily. It is recommended to have the plan to hand.	
The metal part of the NSM casing has been connected to earth (compulsory).	
All components are energised (chiller/heat pump, NTC controllers (terminal unit, NSM).	
Check again that the physical connection of the digital inputs and outputs is correct. Do not connect the NSM to the local network (Ethernet) without first configuring an IP address validated by the network administrator.	

After the first start-up the configuration assistant starts up to guide the user through the system configuration.

NOTES:
- ***The configuration assistant cannot be used on the touch screen and via an internet browser at the same time.***
- ***If the NSM is deenergised during the configuration assistant steps it will start-up again at the first stage.***
- ***All configuration assistant screens will then be accessible.***

Configuration assistant steps

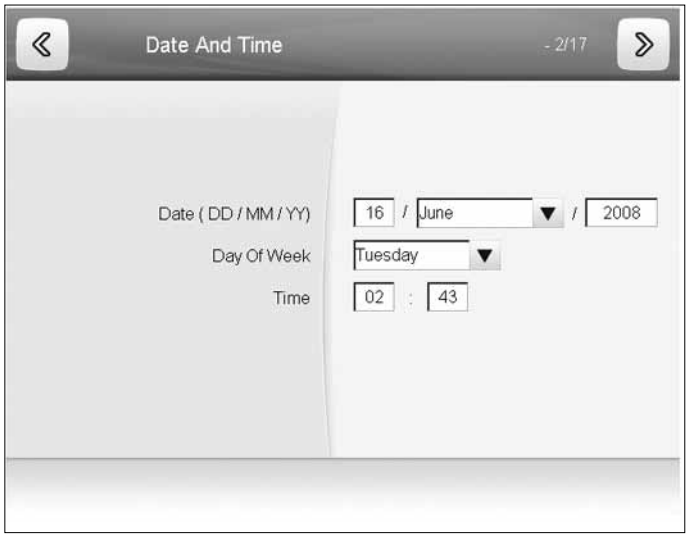
6.2.1 - Step 1 - Language and measurement system choice

- Click on the flag of the required language.
- Enter the currency (preferably three letters), e.g. EUR (Euros), CHF (Swiss Francs) etc.
- In the scroll-down list choose the required measurement system.

NOTE: The selections do not need to be confirmed.

- Press/click the "Next" button to move to the next step.

6.2.2 - Step 2 - Date and time adjustment



- Press/click on the field you want to change.
- Enter the new value.
- Press/click the "Next" button to move to the next step.
- Press/click the "Back" button to move to the previous step.

6.2.3 - Step 3 - Load or create a configuration

Option
- 3/17
Do you have an existing System Manager configuration ?
Yes
No
Yes
(Units must be already addressed)
Use Carrier S-Service to download xml config files.
Press " Next " key when download is done.

- If this is the first start-up or if an old System Manager model is replaced, the user selects "No".
- If the NSM has been replaced, the user can choose "Yes" to load a saved version of the configuration. The configuration assistant finishes with this step.

Loading the configuration for an existing site via the NSM is easy with the S-Service tool of the NSM. Please refer to the documentation for this tool.

6.2.4 - Step 4 - Information on the user site

- The site information (address, telephone etc.) is optional.
- If the e-mail function has been configured, this will be used as the message signature.
- The BACnet IP interface uses the site name to name the "Device" object of the NSM.

6.2.5 - Step 5 - Select the terminal unit search mode on the bus

The use of the CCN protocol requires addressing of each NTC controller on the secondary bus so that they can be used. This step will allow registering the terminal units available on the secondary bus and their CCN addressing. (Please note that the NTC controllers are supplied unaddressed: the default address is 0.1 for all).

Explanation of the three tick boxes on the screen above:

- If the first one is ticked the CCN addresses of all units on the bus are reset to their default value (0.1).
- If the second is ticked, the system looks for unaddressed units.
- If the third one is ticked the system looks for units that are already addressed.

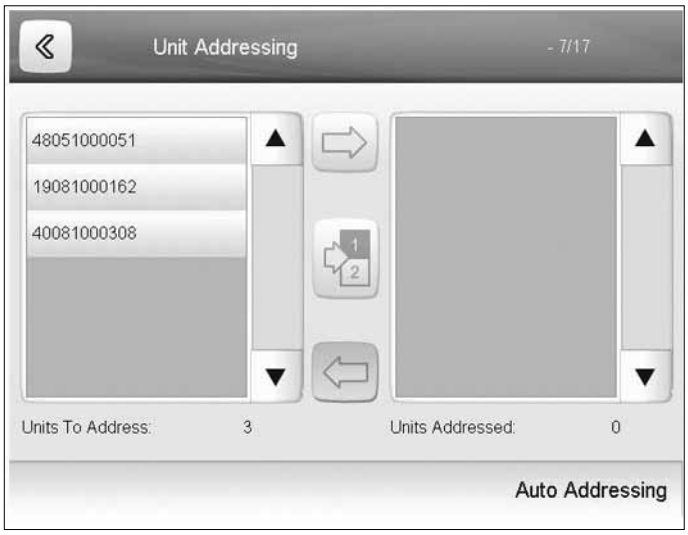
For the first start-up selection of the second tick box is required and sufficient.

NOTE: It is possible to tick several boxes to be viewed in the site history.

6.2.6 - Step 6 - Search for terminal units on the secondary bus

The text displayed on the screen corresponds to the selection(s) made in the previous step. After reading has been completed, the "Next" button is shown.

6.2.7 - Step 7 - Manual or automatic addressing of terminal units



The units are listed here with their serial numbers (NTC labels attached to the plan). The list on the left shows the unaddressed units and the list on the right shows the addressed units.

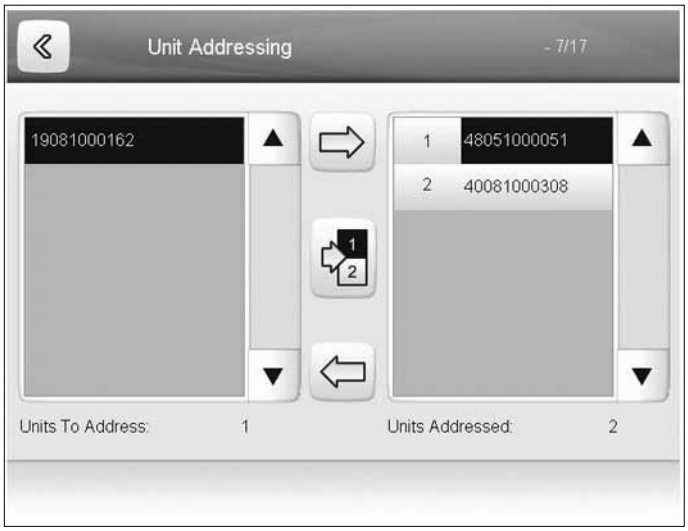
Auto addressing

If all units are in the list of unaddressed units the "Auto Addressing" button is displayed at the bottom right of the screen. With one press/click on the button each unit can be automatically given a CCN address. The first unit in the list takes adddress number 1 and so on.

Manual addressing

Press/click the serial number of the unit to be selected. Once selected, it is highlighted. Press the right arrow button to give the unit a CCN address. The first unit in the list automatically receives address number 1.

Repeat this operation to address the other units. The number displayed corresponds to the CCN address that is given to the controller.



To insert a unit into the list of addressed units the unit to be addressed must be selected and then a unit in the list on the left must be selected (see above). The insertion is always made below the addressed unit selected.

Press/click the button

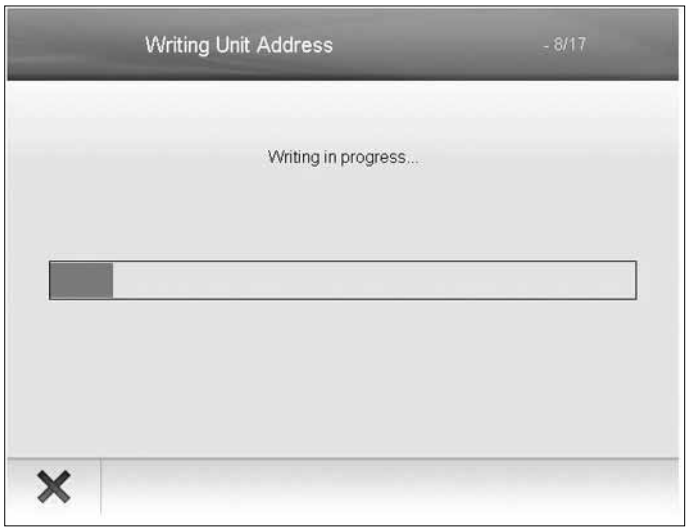
The CCN addresses of the units following the one that was inserted are now all moved down one unit.

If a unit address must be modified, move that unit to the left-hand list by pressing/clicking the left arrow button and then moving it back to the list on the right in the desired position.

NOTE: These operations do not generate any CCN communication and therefore no modification at the terminal units.

This is a preparatory unit addressing step. All units registered must be in the list on the right to be able to pass to the nex step. Then the "Next" button is displayed.

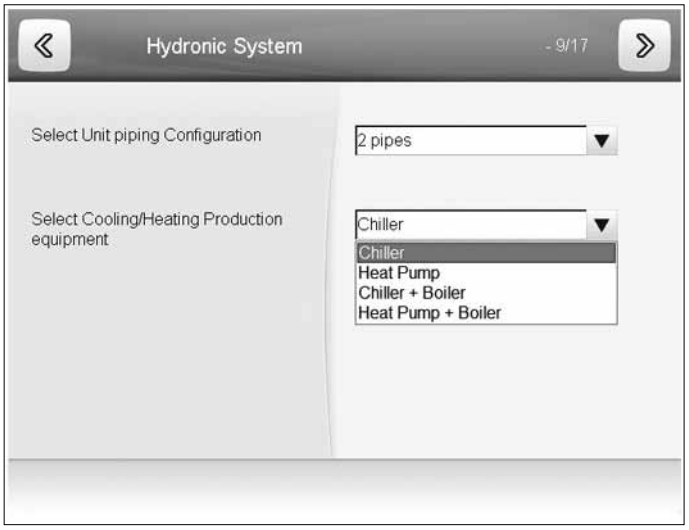
6.2.8 - Step 8 - Writing the terminal unit addresses and data profile of the CCN tables



The NSM writes the CCN addresses in all registered terminal units and reads the CCN tables for each piece of equipment.

Once writing is completed, the "Next" button is displayed.

6.2.9 - Step 9 - Selection of the hydronic system (chapter 10.1)



The two-pipe configuration allows selection of the chiller/ heat pump unit.

The four-pipe configuration is used when the terminal unit includes a cold water circuit and a hot water circuit.

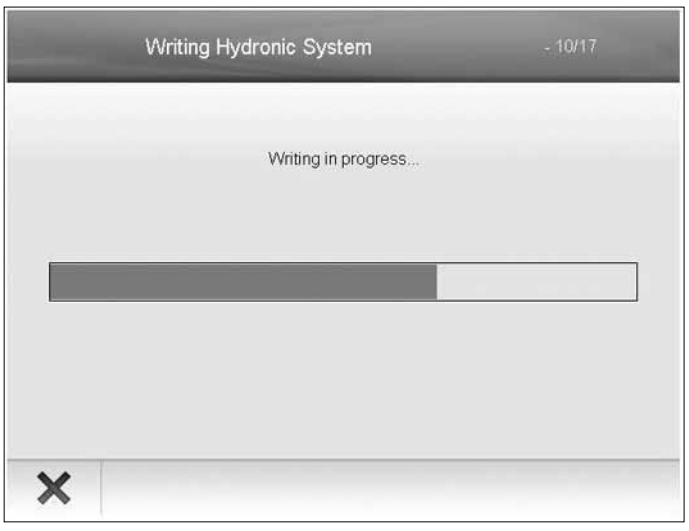
The two-pipe + two-pipe configuration is used for installations where the terminal unit includes a single water circuit but where control of its hot water valve allows circulation of the water in a radiator.

For a system that includes a boiler it is always preferable to connect this to the Carrier cold-water unit outlet provided for this purpose in order to manage the transitions from the cooling mode to the heating mode and vice versa in the best way.

Possible water production configurations
Two pipes:
- Cooling only configuration with/without boiler control,
- Heat pump configuration with/without boiler control.

Four pipes and two pipes + two pipes:
- Cooling only configuration with/without boiler control.

6.2.10 - Step 10 - Write the hydronic system in the terminal units



Writing the hydronic configuration in all NTC controllers.

When writing is completed, the "Next" button is displayed.

6.2.11 - Step 11 - Selection of the chillers (chapter 9.7.3)

If this is a Carrier unit equipped with electronic Pro-Dialog+ control, the water production unit is a CCN unit. Specify the unit CCN address on the primary bus (default is 1).

NOTE: If there is a master/slave configuration between two Pro-Dialog units, only the master unit is controlled by the NSM. It is therefore preferable to use address 2, for example, for the slave unit.

If the chiller/heat pump is not a CCN unit, its start/stop control will be assigned to digital output 1 by default. If the hot water is produced by a boiler, it is automatically given a digital output (output 2 by default).

6.2.12 - Step 12 - Data profile of the CCN chiller

This step is available if the chiller/heat pump is a CCN unit.

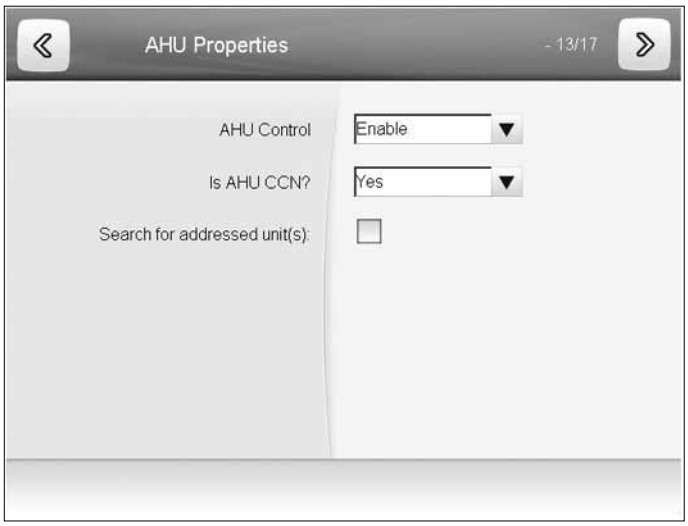
The NSM reads all CCN tables of the chiller/heat pump. This step can take several minutes. The following screen is displayed once the process has been completed.

6.2.13 - Step 13 - Data profile of the air handling unit(s)

If no air handling unit is used, it is sufficient to specify that the NSM does not control the AHU and go to the next step.

If the air handling unit is not a CCN unit its control by the NSM must be authorised and it must be indicated that it is not CCN. Its start/stop command will be attributed to digital output 3 by default.

If the AHU(s) is a (are) communicating Carrier units, its (their) control by the NSM must be authorised and it must be indicated that it is (they are) CCN.



Proceed as follows:

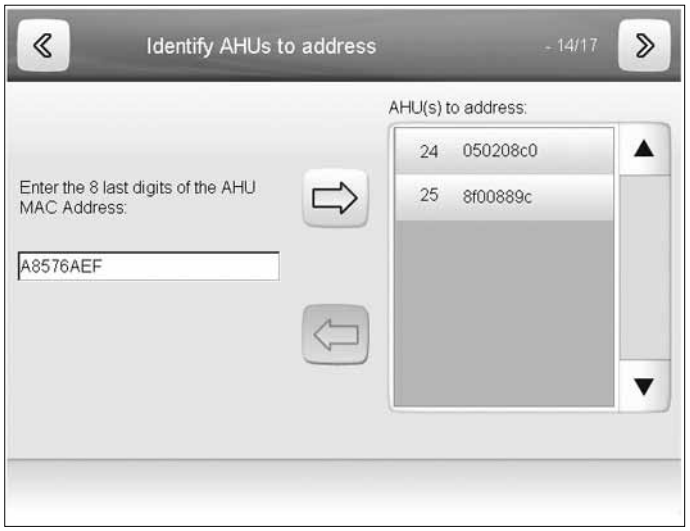
- If only one AHU is present, tick the box "Search for addressed units" so that the NSM can retrieve its identifier,
- If several AHUs are present and at the same CCN address (24 by default), unclick this box and go to the next step,
- If several AHUs are present and at addresses between 24 and 31, tick this box so that the NSM can retrieve their identifiers.

NOTES:

- ***The NSM autorises a single non-CCN AHU or up to eight CCN AHUs (exclusive).***
- ***For the AHUs only the CCN addresses from 24 to 31 are autorised.***

When reading has been completed, press the Next button.

6.2.14 - Step 14 - Manual AHU addressing



The AHUs are identified by their MAC address (labels supplied with the control). The list on the right contains the addressed units, the field on the left is used to enter the identifier of a new AHU.

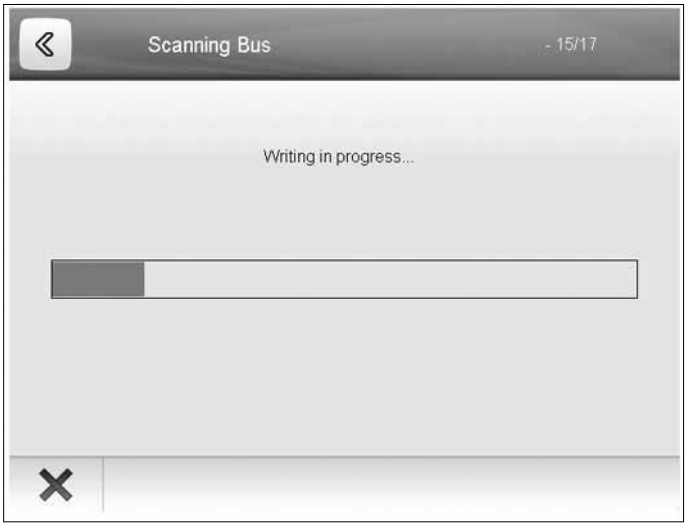
NOTE: Only the last eight characters of the MAC address are used to identify an AHU (example A8576AEF for the MAC address DC:A8:57:6A:EF).

Addressing

- Press/click on the left-hand field of a unit to enter the identifier of an AHU.
- Press the right arrow button to attribute it to a CCN address. The first item in the list automatically receives address 24.
- Repeat this operation to address the other AHUs. The number displayed corresponds to the CCN address it has been given.
- If a unit address must be modified, pass this unit in the left field by pressing/clicking the left arrow button and then place it in the right-hand list.

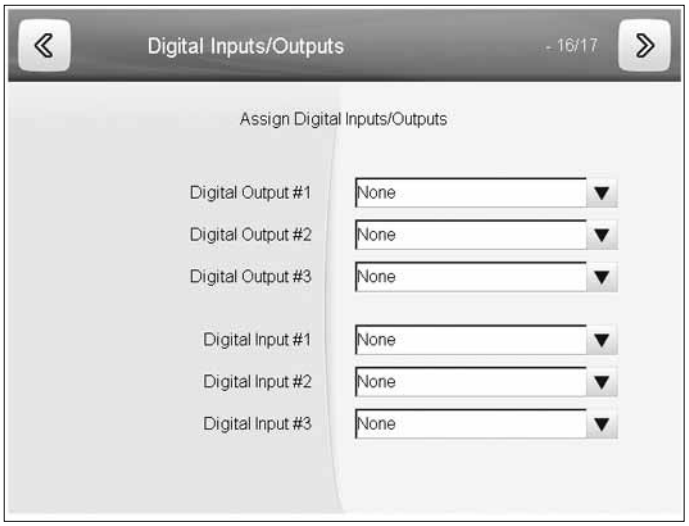
NOTE: These operations do not result in any CCN communication and no modification at the AHU.

6.2.15 - Step 15 - Writing the CCN addresses and data profile of the CCN tables



The NSM writes the CCN addresses in all registered AHUs and reads the CCN tables of each piece of equipment. When the step has been completed, the "Next" button is displayed.

6.2.16 - Step 16 - Configure the digital inputs and outputs (chapters 10.1.6 and 10.1.7)



Possible configurations of the digital outputs

- No assignment "None": output always open.
- Controlled by a time schedule "Schedule": output closed in occupied mode.
- Start/stop control of a non-CCN water production unit "Chiller On/Off": output closed for the start-up.
- Heating/cooling mode control of the non-CCN water production unit "Chiller heat/cool": output closed for the heating mode and open for the cooling mode.
- Boiler start/stop control: output closed for the start-up.
- Air handling unit start/stop control: output closed for the start-up. Please note that this output can also be controlled by a time schedule.
- From the "System Alarm" information re-copy:
  - system alarm present = contact closed,
  - no system alarm = contact open.

- Energy alert: this output is used together with the energy management algorithm:
  - 10-minute energy lower than the configured threshold: contact open,
  - 10-minute energy higher than the configured threshold: contact closed.

NO means "normally open".
NC means "normally closed".

Possible configurations of the digital inputs

- No assignment "None".
- Frost protection NO/NC: allows switching all controllers to the frost protection mode.
- Stop control NO/NC: allows switching all controllers to the stop mode.
- Alarm, water production unit NO/NC: If a non Carrier chiller/heat pump is in alarm status, this input can be used to indicate that the unit is no longer available.
- Boiler alarm NO/NC: if the boiler is in alarm status, this input can be used to indicate that the boiler is no longer available.
- Air handling unit alarm NO/NC: if the air handling unit is in alarm status, this input can be used to indicate that the air handlig unit is no longer available.

For these three alarms: an NO contact with open input = no alarm, with closed input = alarm.

- Terminal unit electric heater unloading NO/NC: together with the unloading algorithm "loadshed", this input can be used to validate and invalidate a loadshed period. An NO contact with open input = no loadshed.
- Energy limiting (NO): this input is used together with the energy management algorithm:
  - energy limiting activated, if the input is "closed",
  - energy limiting deactivated, if the input is "open".

6.2.17 - Step 17 - End of configuration assistant

Pressing the "End" button will end the configuration assistant and display the welcome screen (chapter 7).

Following a restart the NSM will always display this welcome screen and no longer the one of the configuration assistant.

NOTE: All configurations carried out by the assistant can be modified again later.

To completely reset the system and restart the configuration assistant please refer to chapter 9.6.2.6.

6.3 - Back-up of the NSM configuration

It is recommended to save a back-up of the NSM database, as this contains the complete site configuration.

This back-up can be made with the NSM service tool. Please refer to the documentation for that tool.

6.4 - Loading a back-up configuration

Loading the database of an existing site to the NSM is easy with the NSM service tool. Please refer to the documentation for this tool.

7 - WELCOME SCREEN

After the configuration assistant has finished, the following welcome screen is shown. This screen is considered as the default screen of the NSM and will be displayed automatically after a period of user inactivity (configurable) or after power is restored to the unit.

8 - ACCESS MODE

There are three access modes to the NSM functions, the guest mode (default) and the Advanced and Service modes that require a password. The Service mode gives access to advanced CCN functions of the NSM.

Functions	Guest		Advanced		Service	
	Accessible	Configurable	Accessible	Configurable	Accessible	Configurable
System						
System preferences						
- Language	X	X	X	X	X	X
- Site	X	X	X	X	X	X
- Advanced/Service password			X	X	X	X
- Date and time/summer time/winter time management	X	X	X	X	X	X
- E-mail configuration	X	X	X	X	X	X
System maintenance						
- See/verify/override the terminal units available on the secondary bus			X	X	X	X
- Add/remove units			X	X	X	X
- Initialise the system			X	X	X	X
- Modify/change the chillers/heat pumps			X	X	X	X
- BACnet (network number, NSM instance)					X	X
Alarms						
Display unit/CCN chiller/heat pump	X		X		X	
Terminal units						
- Name/occupancy mode/operating mode/setpoint temperature	X		X		X	
- Renaming	X	X	X	X	X	X
- Configuration copy	X	X	X	X	X	X
- Setpoint	X	X	X	X	X	X
- Room temperature/fan speed/water temperature/water valve control status/electric heater control status/digital NTC input status	X		X		X	
- Occupancy period control		X		X		X
- NTC CCN tables			X	X	X	X
- Master/slave configuration			X	X	X	X
- Zoning configuration			X	X	X	X
- Trend tracking	X	X	X	X	X	X
- BACnet configuration (COV, alarm, notification)			X	X	X	X
Zones						
- Creation	X	X	X	X	X	X
- Renaming	X	X	X	X	X	X
- Copying	X	X	X	X	X	X
- Deletion	X	X	X	X	X	X
- Setpoint	X	X	X	X	X	X
- Members	X	X	X	X	X	X
- Occupancy period control	X	X	X	X	X	X
Time schedules						
- Creation	X	X	X	X	X	X
- Renaming	X	X	X	X	X	X
- Copying	X	X	X	X	X	X
- Deletion	X	X	X	X	X	X
- Time schedule events	X	X	X	X	X	X
- Members	X	X	X	X	X	X
Production						
System						
- System Manager	X	X	X	X		
- Algorithm (on/off)	X	X	X	X	X	X
- Advanced algorithm configuration			X	X	X	X
- Hydronic system configuration	X		X	X	X	X
- Summer winter setpoint	X	X	X	X	X	X
- Digital input/output configuration	X	X	X	X	X	X
- BACnet configuration (COV, alarm, notification)			X	X	X	X
- Water production unit						
- Status	X		X	X	X	
- Trend tracking	X	X	X	X	X	X
- BACnet configuration (COV, alarm, notification)			X	X	X	X
- Air handling unit						
- Status	X	X	X	X	X	
- Air handling unit algorithm	X	X	X	X	X	X
- Trend tracking	X	X	X	X	X	X
- BACnet configuration (COV, alarm, notification)			X	X	X	X
- Energy			X	X		
- Metering input configuration			X	X	X	X
- Consumption			X	X	X	X
- Consumption history			X	X	X	X

NOTE: Certain configuration modifications also require system shut-down (see chapter 10.1.1).

8.1 - Guest mode (screen H)

To access screen H press/click the button

The guest mode allows the user to control all daily system operations.

By default access to this mode is possible without password, but access with a password can be configured (see chapter 9.3).

8.2 - Advanced/Service mode

Access to this mode is password protected.

To connect in the Advanced or Service mode and to access screen H press/click the following button on the welcome screen:

Press/click in the editable field and enter the password for the Advanced or Service mode.

NOTE: As the default there is no password. To connect simply validate an empty field.

If the password is correct, the OK button is shown.

The "Logout" button allows return to the guest access mode.

8.3 - Reboot of the NSM application (screen H)

The reboot function of the NSM application is available with the "Reboot" button.

This function is useful to reorganise and display the unit, zone and time schedule names in alphabetical order.

8.4 - Display of the NSM software version (screen H)

The NSM software application version is displayed here, for example ECG-ST-20KE6030.

9 - NSM INTERFACE CONFIGURATION (SCREEN A)

Access to the NSM configuration parameters is from the welcome screen, pressing the button"System Settings" (screen A).

This screen allows access to:

- the language and unit of measurement selection (chapter 9.1),
- the site information (chapter 9.2),
- the Advanced and/or Service password modification and inactivity periods that allow return to the welcome screen and to the guest access mode (Advanced and Service modes only),
- the date and time adjustment (chapter 9.4) and the modification and activation of the summer to winter time changeover and vice versa,
- the configuration of the e-mail server properties,
- The "System Management" menu is only accessible in the Service mode. It allows access to advanced system and maintenance functions.

9.1 - Modify the language and the measurement system (screen A-1)

In screen A (System Settings), press/click the "Language" button (screen A-1). See section 6.2.1.

Procedure for selecting a language and/or adding a language

- Use the NSM service tool (refer to the documentation for this tool) to recover the language files.
- The language file is a text file. It is editable with the Windows noteblock. A semicolon separates the text in the English language from the translated text. Only the translated text that is after the semicolon must be modified. Carry out the required modifications.
- Use the NSM service tool to download the file of the modified language.

The language file, that is accessible when pressing/clicking the flag for Esperanto "Other" has the name "lngOther.csv".

It can be used to translate the NSM into a language that is not in the list. To translate the NSM into that language, use the same operating mode as before.

9.2 - Find/modify information about the operating site (screen A-2)

In screen A (System Settings) press/click the "Location" button (screen A-2). See section 6.2.4.

9.3 - Modification or adding a password or modification of the time to automatically return to the guest mode (screen A-3)

Connect in the Advanced mode. In screen A (System Settings) press/click the "Security" button (screen A-3).

The "Service" access level allows display and configuration of all NSM parameters, but also read/write access to the CCN tables of the terminal units. Only a user with "Service" access can modify the "Service" password.

The "Advanced" password allows access to the advanced NSM parameters.

The "Guest access" password allows any user secure access from a web browser and/or the touch screen interface.

If the "Ask Password" parameter has been configured to "Network" or "local", the "Guest user"password will be requested before the welcome screen is displayed for access via a web browser or via a touch screen interface.

If the "Ask Password" parameter has been configured for "any user", a password will be requested before the welcome screen is displayed for access via a web browser or via a touch screen interface

If the "Ask Password" parameter has been configured to "Never", no "Guest access" password will be requested.

Password modification

- Press/click the "Edit" button.
- Press/click the field to be modified and enter the new password. Confirm this.

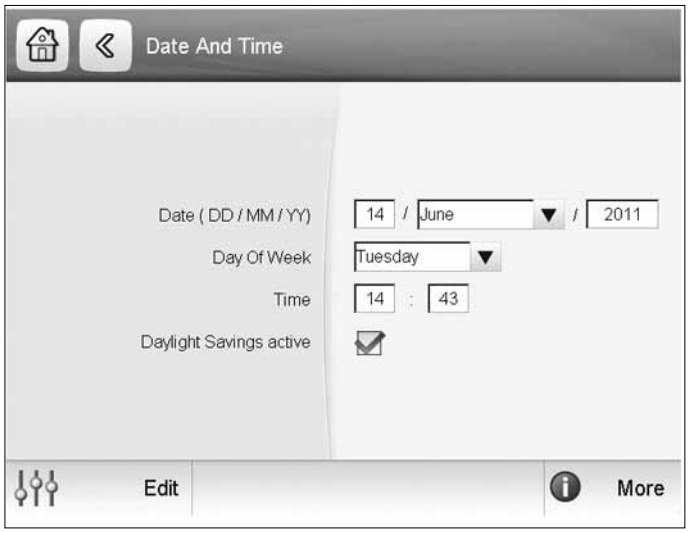
NOTE: It is not possible to enter a blank field as password.

Modification of the inactivity time that allows automatic return to the guest mode and to the welcome screen

- Enter the number of minutes (from 5 to 120 minutes) at the end of which the system returns to the guest mode and to the welcome screen.
- Press/click the "Save" button.
- Press the "Logout" button to reactivate the security settings.

9.4 - Modify date and time (screen A-4)

In screen A (System Settings), press/click the "Date & Time" button (screen A-4). See section 6.2.2.



NOTE: The information about summer time control is given for information only and cannot be changed. It is activated when the changeover to summer time takes place.

9.5 - Summer time control (screen A-4-1)

In screen A-4 (Date & Time) press/click the "More" button (screen A-4-1).

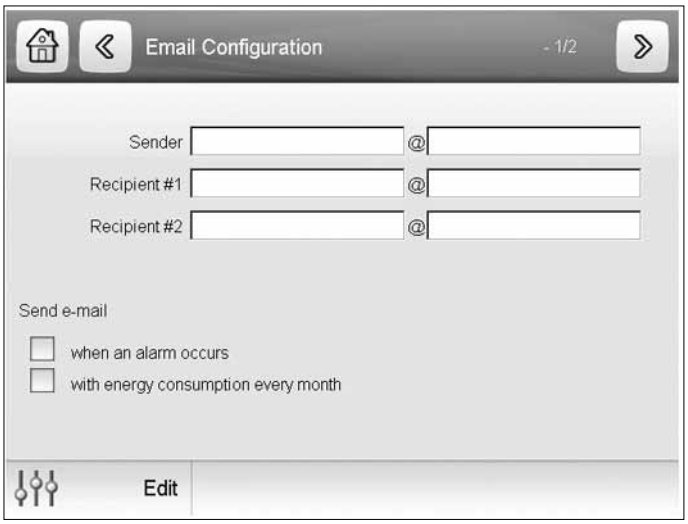
The default values have been defined for European countries.

To change them:

- Enter the new value.
- Press/click the "Save" button.

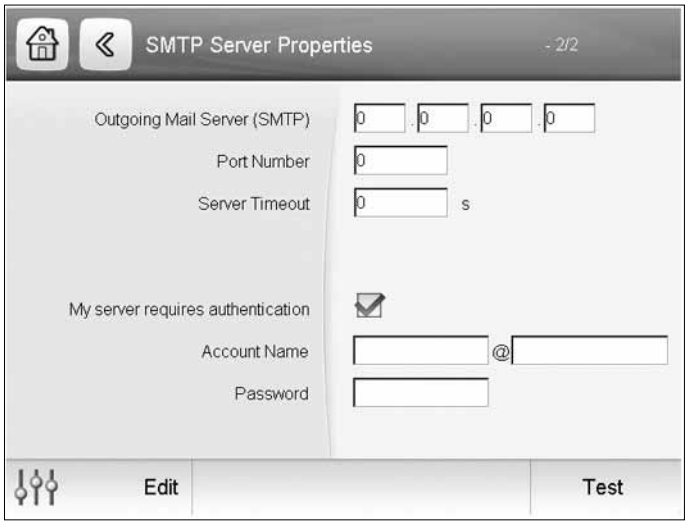
9.6 - Configure access to the e-mail server (screen A-5)

In screen A (System Settings), press/click the "E-mail Server" button.



- "Sender: indicates the NSM address. This can be chosen, as preferred by the user, but certain servers may require authentication.
- "Recipient": e-mail address of the recipient (maximum two recipients).
- "Send e-mail":
  - Tick the box "when an alarm occurs" to receive an e-mail when an alarm appears on one of the terminal units or chillers/heat pumps or air CCN handling units. A text file containing the description of all detected alarms will be attached to the e-mail.
  - Tick the box "with energy consumption every month" to receive an e-mail containing the daily energy consumption since the beginning of the calendar year each month. An e-mail per meter will be sent together with an attached file showing the consumption in .csv format.

Press/click the "Next" button to display the e-mail server properties.



- "Outgoing mail server SMTP": "Port Number" and server ask for the network administrator e-mail server IP address, the port number used (default is 25) and the maximum server response time.

If the server requires authentication, tick the box and fill in the fields "Account Name" and "Password".

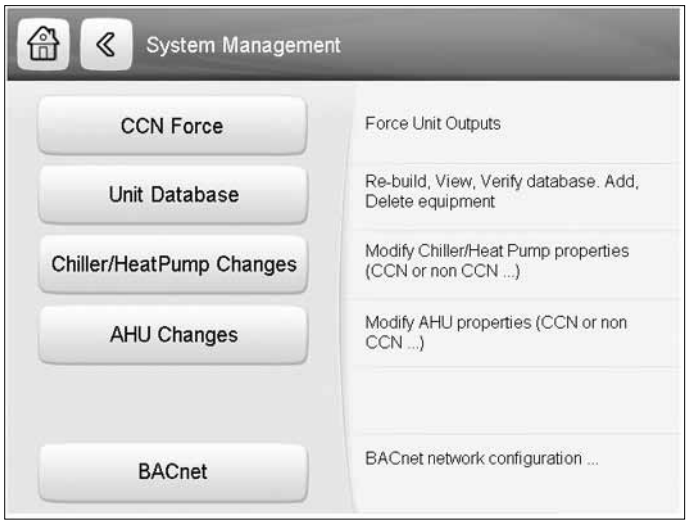
Verify that the "Network" configuration of the NSM is valid (see chapter 16).

The "Test" button allows sending an e-mail to validate the configuration.

9.7 - Aquasmart system management (screen A-6, Service mode only)

Reserved for the Service mode.

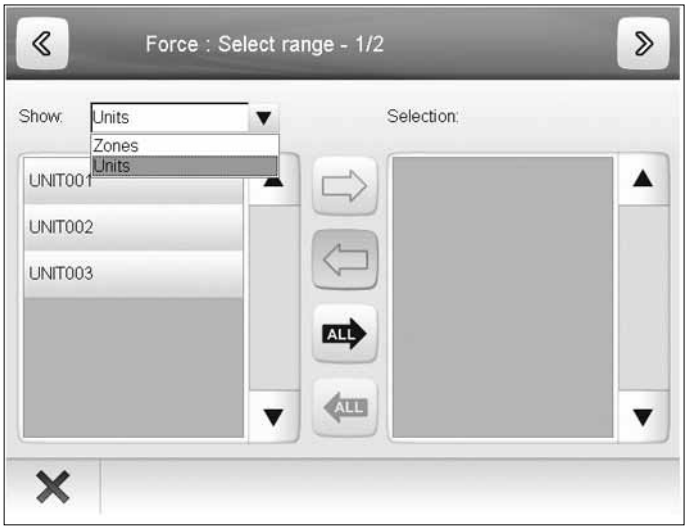
Access to the NSM system management is from the welcome screen by pressing the "System Settings" button (screen A) and then the "System Management" button (screen A-6).



9.7.1 - Force/release the terminal unit controller outputs (screen A-6-1)

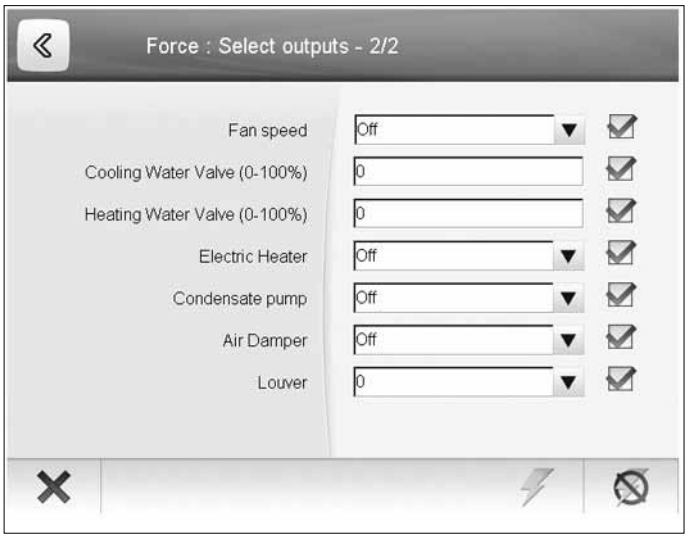
Access to this NSM system management screen is from the welcome screen by pressing the "System Settings" button (screen A), then the "System Management" button (screen A-6) and then the "Force" button (screen A-6-1).

To select the units or zones to force/release please refer to section 6.1.3.



Once the selection has been made, press/click on the "Next" button.

Select the outputs to be forced or released, or enter the override value.

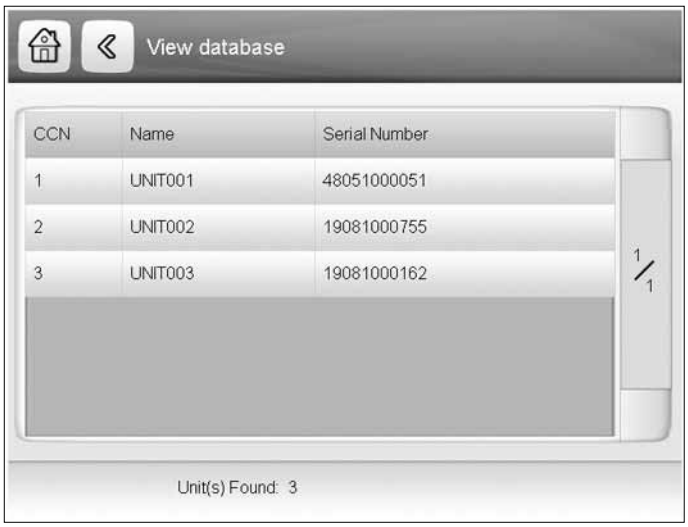


To force a setting, select the override value and transmit the override parameter by clicking the "Force" button.

Once the system management operation has been completed, the selected outputs must be released by pressing the "Auto" button or switching off the power supply to the relevant NSM and then switching it back on.

The following screen will then be displayed, indicating the writing progress for the terminal units. If this is not the case, an error message will be displayed (communication problem, insufficient priority).

The NSM forces the CCN variables to a "Supervisor" level.



9.7.2 - Terminal unit database management

9.7.2.1 - Database management in a list of the terminal units (screen A-6-2)
Access to this NSM system management screen is from the welcome screen by pressing the "System Settings" button (screen A), then the "System Management" button (screen A-6) and then the "Unit Database" button (screen A-6-2).

This screen gives access to:
- the registration of the terminal units controlled by the NSM,
- the verification of the database integrity compared to the units actually connected to the bus,

and permits:
- adding/removing one or several terminal units,
- removing the NSM database and resetting the CCN addresses of the terminal units to their default value (0,1). This action allows a return to the configuration assistant (see section 6.1.1).

9.7.2.2 - Access to the units registered in the database (A-6-2-1)
The Service mode is required.

Press/click the "View" button (screen A-6-2).

This screen lists all units included in the database. CCN and serial number columns indicate the equipment CCN address on the secondary bus and its serial number.

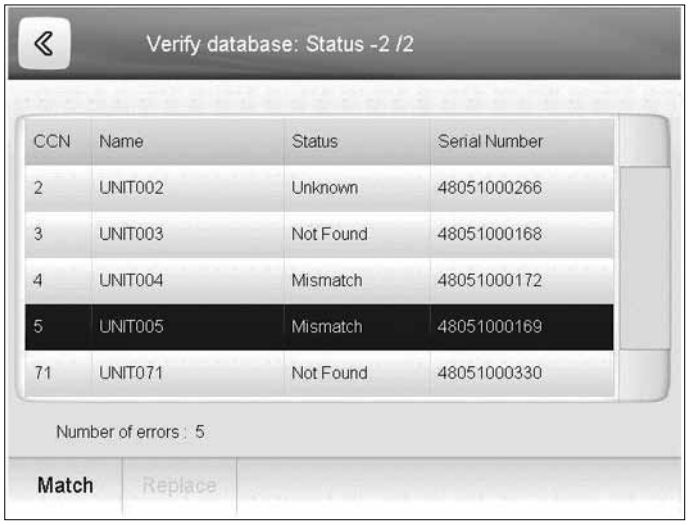
The up/down arrows on the right-hand side of the list display the next or previous page.

9.7.2.3 - Verification of the availability and integrity of units on the bus with the units in the database (A-6-2-2)
The Service mode is required.

Press/click the"Verify/Update" button (screen A-6-2). To carry out this operation it is necessary to first deactivate the system control by the NSM. Go to screen F-3-3 and deactivate the NSM control.

This operation is in two steps:
- The first step scans the secondary bus. The NSM searches for addressed and unaddressed units.

- During the second step, the NSM compares the units found with the units shown in the database and indicates any differences in a list.



The possible differences are:

- "Not found": The unit is included in the database, but cannot be found on the bus. Verify that the unit is energised, that the CCN connector is correctly fitted. If the unit no longer exists, it must be removed from the database (see screen A-6-2-4).
- "Unknown": A unit present on the bus is not shown in the database. If this is replacement unit, select the unit and press the "Replace" button. Then select the unit to be replaced in the list.
- "Mismatch": The CCN address and the serial number do not correspond to those registered in the database. Select the unit and use the correction button "Match" to update the database.

Once a difference has been corrected, the unit(s) concerned are automatically removed from the list.

9.7.2.4 - Add units to the database (A-6-2-3)
The Service mode is required.

Press/click the "Add"button (screen A-6-2).
To carry out this operation, it is necessary to first deactivate the system control by the NSM. Go to screen F-3-3 and deactivate the NSM control.

This operation includes four steps.

Step 1
Go to menu A-6-2-3 and select unaddressed units and/or units addressed with the CCN search function.

See section 6.2.5.

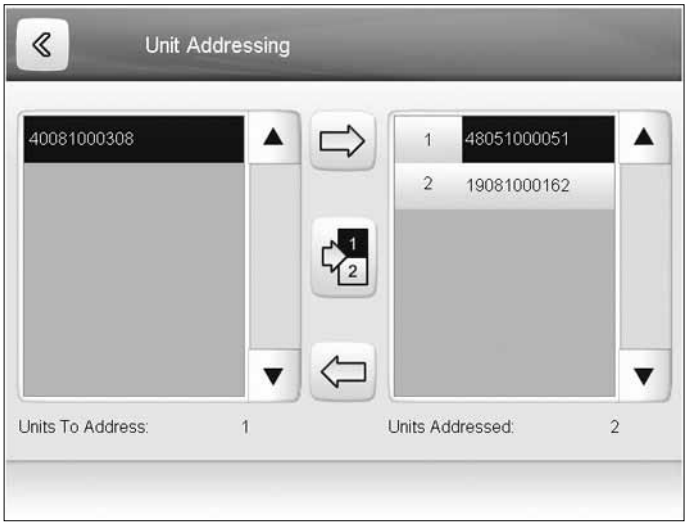
Press the "Next" to go to the next step and carry out the search.

Step 2

See section 6.2.6.

Once the search has been completed, the "Next" is shown. Press/click the button to display the units found.

Step 3



See section 6.2.7.

After all units have been addressed, press/click the"Next" button to go to the next step.

Step 4
The NSM writes the CCN addresses in all terminal units.

See section 6.2.8.

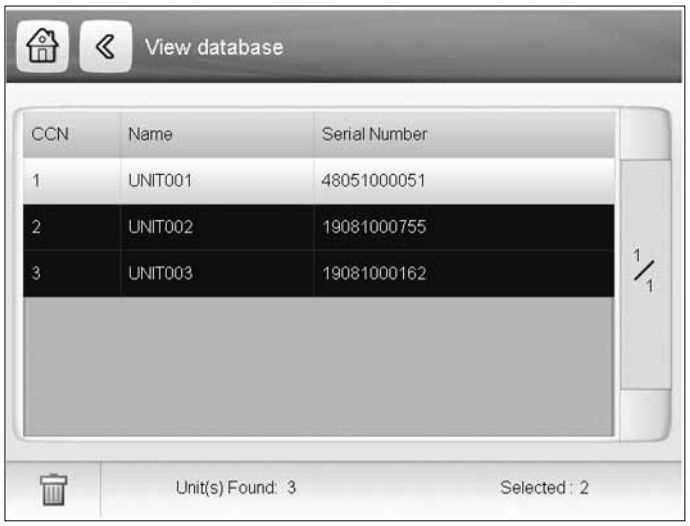
9.7.2.5 - Removal of units from the database (A-6-2-4)
The Service mode is required.

Press/click the "Remove" button (screen A-6-2).

To carry out this operation, it is necessary to first deactivate the system control by the NSM. Go to screen F-3-3 and deactivate the NSM control. Then go to menu A-6-2-4 and confirm the progress of the operation.

The list of units present in the database is displayed. Press/click on the name of a unit to select it. Once selected, it is highlighted.

Press/click the "Remove" button to remove the units from the database.



9.7.2.6 - Re-initialize the database (A-6-2-5)
The Service mode is required.

Press/click the "Initialize All" button (screen A-6-2)

ATTENTION: This operation erases the database, and initializes the CCN addresses of the controllers. The NSM will then restart as in the first start-up with the configuration assistant screen.

The confirmation screen is then displayed:

Press/click "Yes"to confirm the complete system initialisation. The following screen will display the continuation of the first screen of the configuration assistant (see 6.1.1).

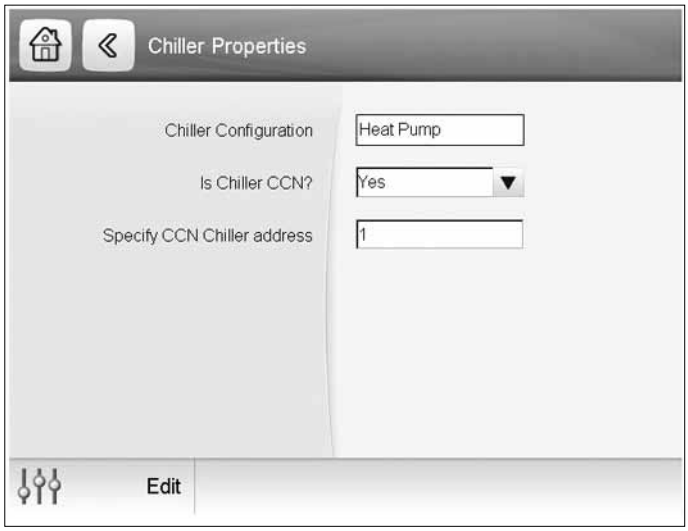
NOTE: During this operation, everything is deleted including the Advanced password which is returned to its default value.

9.7.3 - Modify/update the CCN and non-CCN chiller/heat pump

The Service mode is required.

This function is necessary to update the CCN parameters of the chiller/heat pump if its software is upgraded.

In screen A6 press/click the "Chiller/HeatPump changes" button to move to screen A-6-3 and choose the chiller/heat pump control mode. See section 6.2.11.

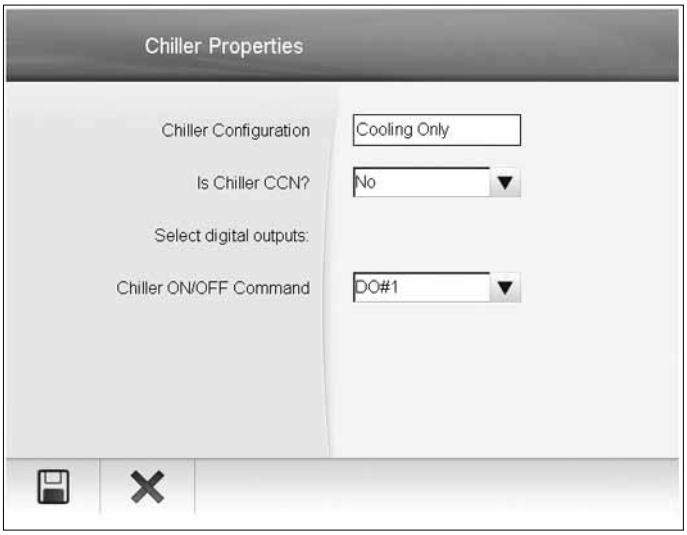


A back-up of the parameters above results in a new CCN data profile of the unit.

See section 6.2.12.

Once the data profile has been completed, the following screen is displayed:

If the chiller/heat pump is a non-Carrier unit it is a non-CCN chiller/heat pump and the digital NSM output to be used for the control must be indicated.



For reversible non-CCN units, the heating/cooling control will be assigned as a default at the second digital output.

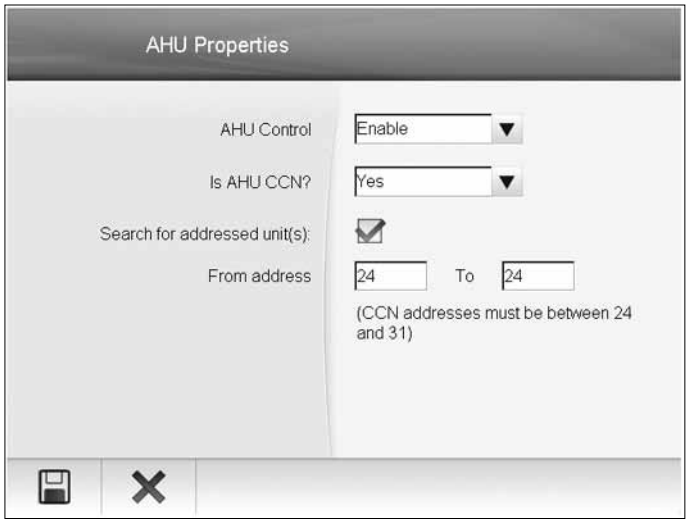
9.7.4 - Modifying/updating CCN and non-CCN air handling units

The Service mode is required.

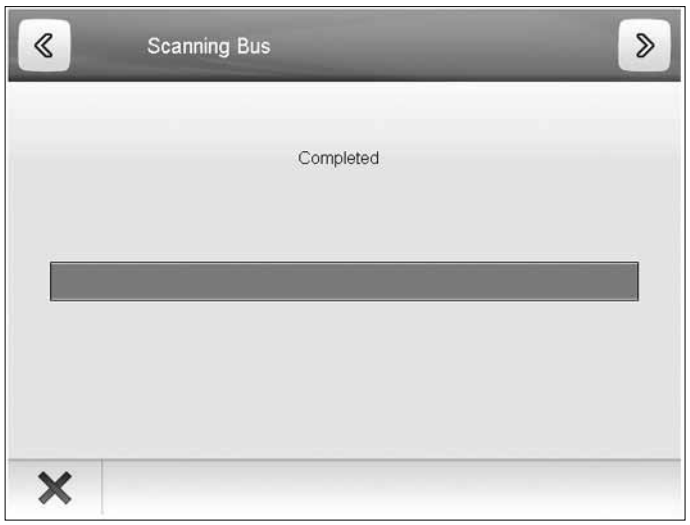
This function is required to update the CCN parameters of the air handling unit(s) and to add or remove one or several air handling units.

In screen A6 press/click on the button "AHU changes" to display screen A-6-4 and authorise the NSM command to the air handling units.

See section 6.2.11.

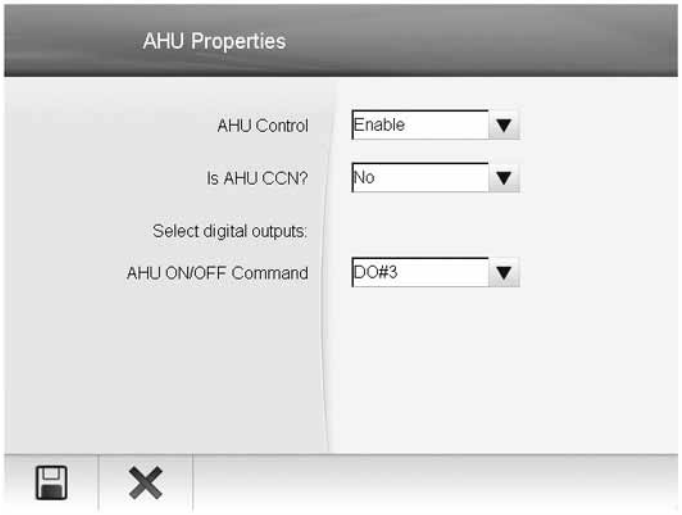


A back-up of the parameters above results in a new CCN data profile of the air handling unit(s).



In this screen it is possible to add new air handling units (see section 6.2.13).

If the air handling unit is not a Carrier unit, it is not CCN and the digital output of the NSM to be used for the control must be indicated.



9.7.5 - Starting/stopping BACnet

Reserved to the Service mode.

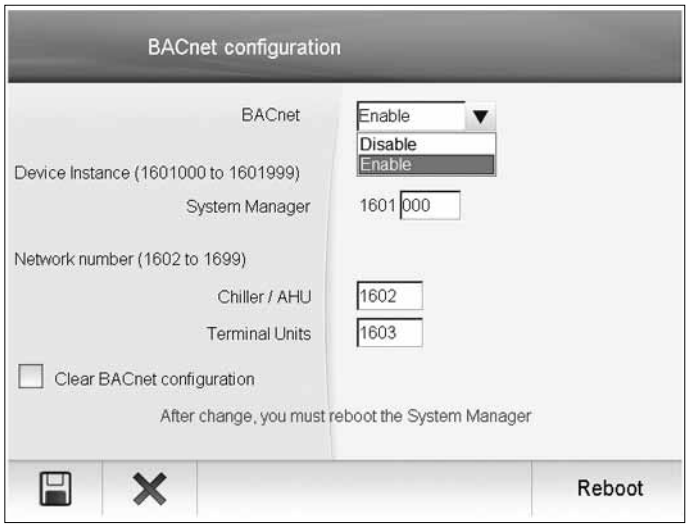
If the BACnet option is supported by the NSM, access to the BACnet configuration parameters of the NSM is from the welcome screen by pressing the "System Settings" button (screen A), then the "System Management" button (screen A-6), and finally the "BACnet" button (screen A-6-1).

To access this screen, system control by the NSM must be deactivated (see screen F-1-3).

By default the BACnet option is not allowed to start. Once the system operates correctly, BACnet can be authorised to start (enable) and if required later to stop (disable).

It is recommended to refer to chapter 16 for more information about the BACnet IP interface supported by the Aquasmart system.

IMPORTANT: The NSM must be re-started in order to take the modifications made into consideration.



9.7.6 - Deleting all BACnet configurations made

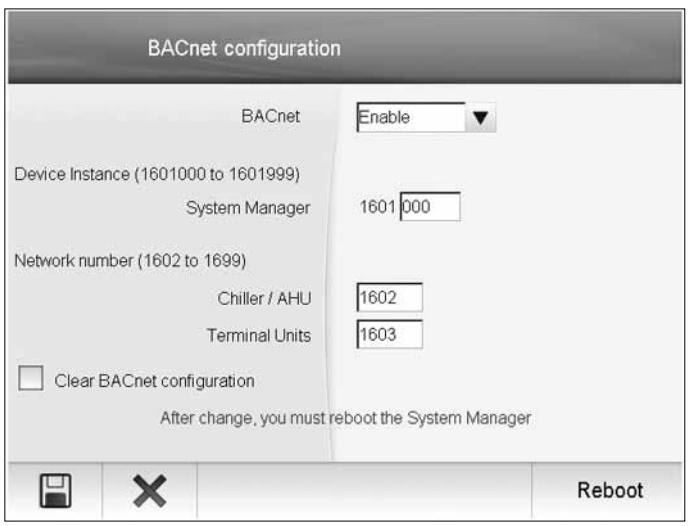
In this screen tick the "Clear BACnet configuration" box and save to delete all BACnet configurations made (COV, alarm, notification). When the NSM restarts a new BACnet database with the default parameters will be created automatically.

IMPORTANT: The NSM must be re-started in order to take the modifications made into consideration.

9.7.7 - Modifying the BACnet network numbers and the NSM instance number

Reserved to the Service mode.

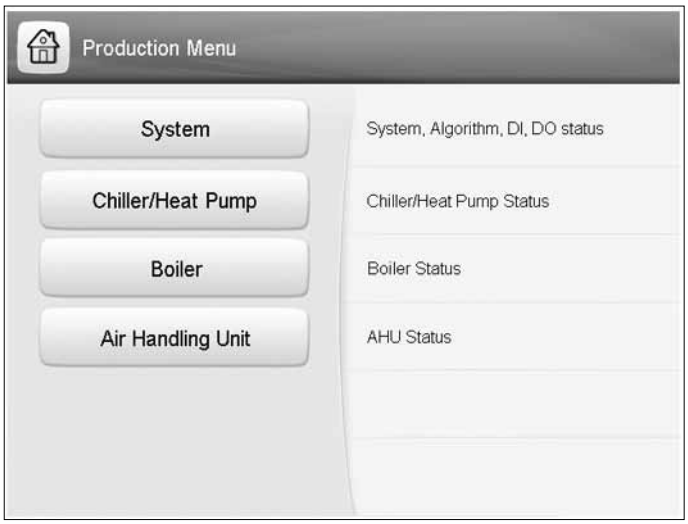
The virtual BACnet numbers and the NSM identifier must be modified if several Aquasmart systems are located on the same BACnet IP network so that each device has its own unique identifier.



10 - CHILLER/HEAT PUMP MANAGEMENT (SCREEN F)

Access to the chiller/heat pump NSM parameters is from the welcome screen by pressing the "Production" button (screen A).

Depending on chillers/heat pumps listed in the NSM, the buttons and information relating to the "Boiler" and the "Air Handling Unit" can be masked.

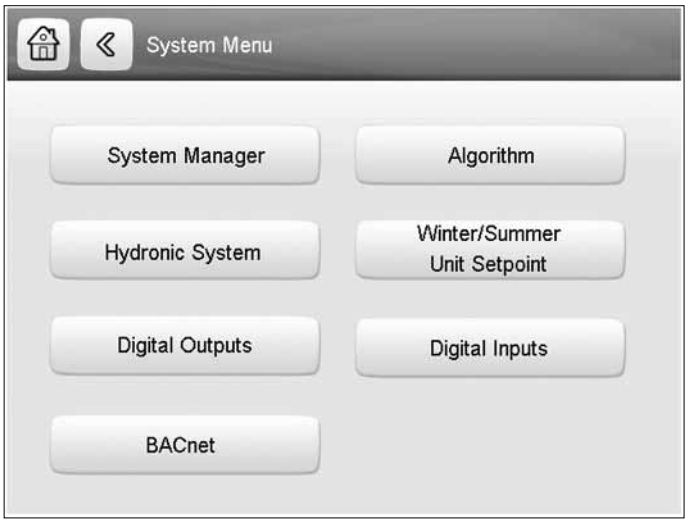


This screen gives access to:

- the system start-up and configuration,
- the chiller/heat pump status and configuration,
- the boiler status (if used),
- the air handling unit status and configuration (if used).

10.1 - System

Access to this NSM maintenance screen is from the welcome screen by pressing the "Production" button (screen A) and then the "System" button (screen F - screen F-1).



This screen gives access to:

- the system start-up and configuration,
- the algorithm start-up,
- the hydronic system configuration,
- the summer and the winter setpoint configuration,
- the digital output configuration,
- the digital input configuration.
- the configuration of the BACnet options (COV, alarms) and the alarm notification

10.1.1 - Authorisation/deactivation of the system control via the NSM (Screen F-1-3)

In screen F-1 press/click the "System" button to move to screen F-1-3.

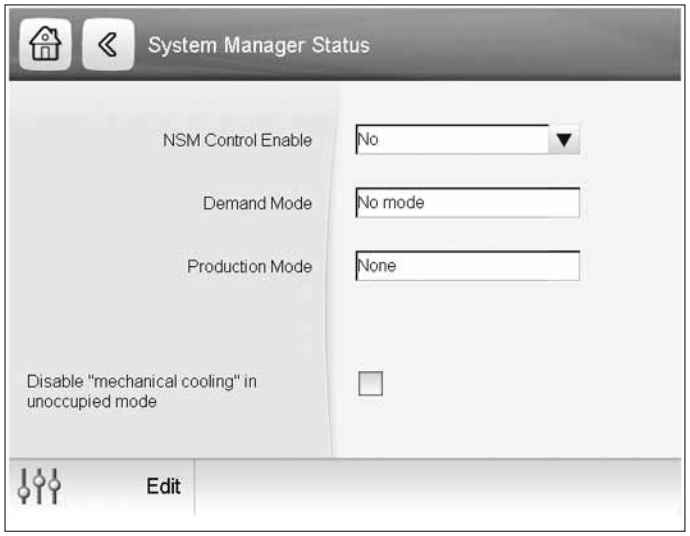
Authorisation of system control via the NSM

This point allows the Aquasmart system to enter the operating phase. To authorise, select "Yes". After the point status goes to "Yes", the NSM carries out the calculations, activates the time schedules, carries out a periodical check of the terminal units, determines a system operating mode and acts on the chillers/heat pumps.

To save energy it is possible to tick the box "Disable cooling in unoccupied mode" to stop the cooling mode when all units are in an unoccupied period.

If the status is "No", the installer can carry out a maintenance operation without interference or disturbance with the operation of the NSM algorithms.

NOTE: It is recommended to validate the NSM control once the system is fully operational.



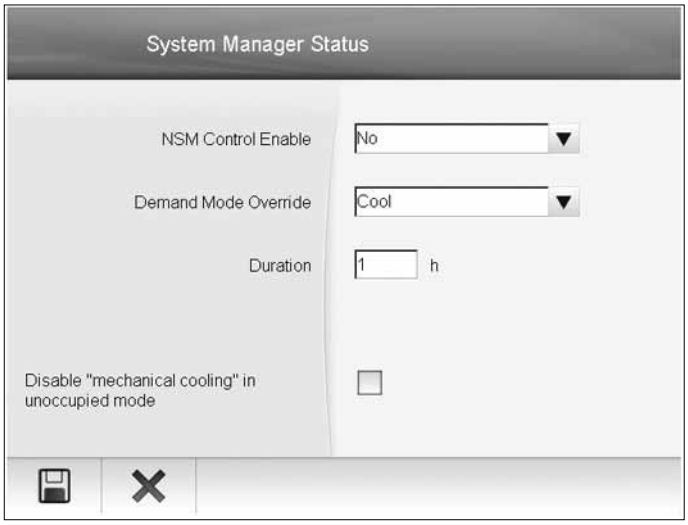
Demand mode override

The mode can be forced by pressing the "Edit" button for a given time to the following values:

- cooling,
- heating,
- neither cooling nor heating,
- no override (default).

Demand override duration

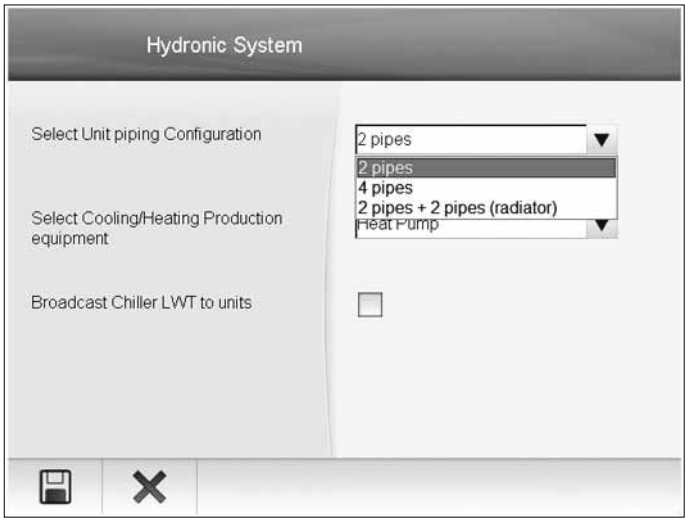
- limit values: 1 hour to 12 hours,
- default value: 1 hour.

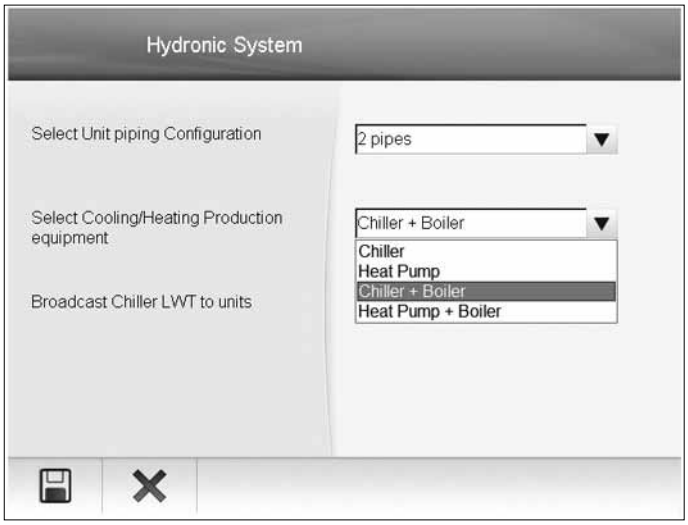


10.1.2 - Modify the water circuit type and the water production source (screen F-1-1)

Advanced mode required for this modification.

In screen F-1 press/click the "Hydronic System" button to enter screen F-1-1. See section 6.2.9.

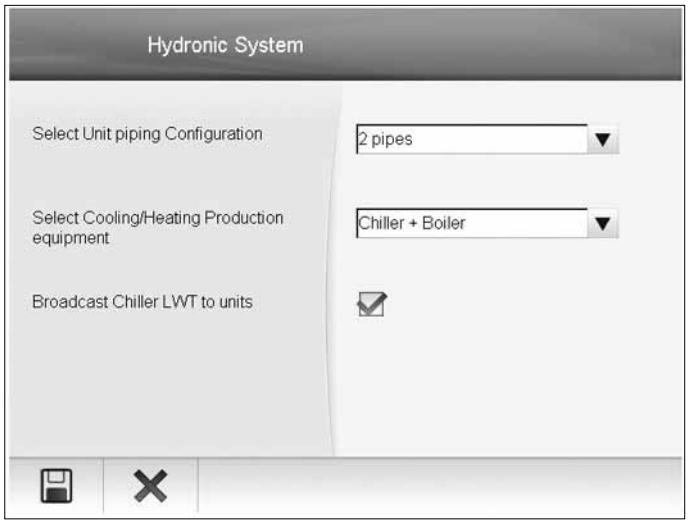




If the hydronic system configuration is modified, the NSM writes the configuration to the controllers: see section 6.2.10.

10.1.3 - Configure the broadcast of the unit leaving water temperature from the CCN chiller/heat pump to the terminal units (Screen F-1-1)
Advanced mode required for a modification.

Ticking the box allows the leaving water temperature of the Carrier chiller/heat pump to be broadcast to the terminal units every three minutes. The broadcast is effective if the NSM is authorised to control the complete equipment.



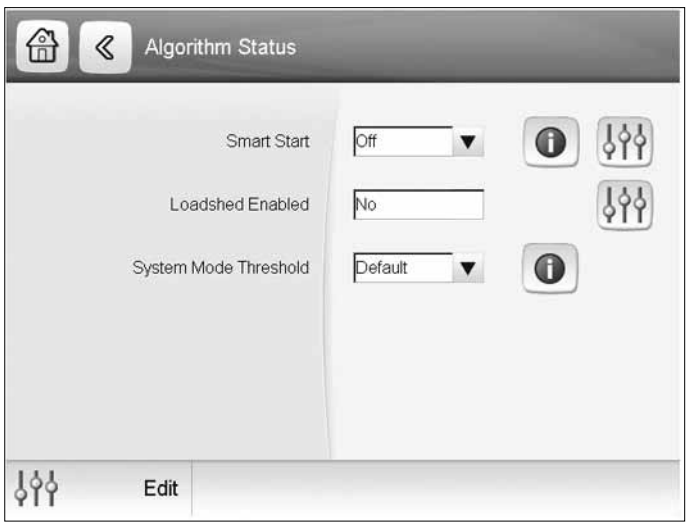
NOTE: The unit hot water leaving temperature does not consider the temperature increase due to the additonal electric heater stages.

10.1.4 - Configuration of the NSM algorithms (screen F-1-2)
This screen indicates the current algorithm status.

- The "Smart Start" algorithm allows daily change of the unit start-up and of the terminal units to occupied mode at seasonal conditions.
- The "Loadshed" algorithm allows electric heater unloading for the terminal units selected after reading a digital input.
- The "System Mode Threshold"algorithm can determine the units to be taken into consideration when calculating the cooling and heating demand.

The Advanced mode is required if detailed information on the operation of these algorithms is required.

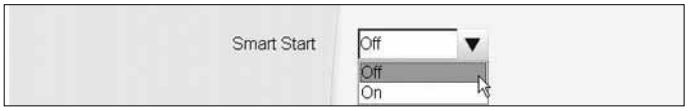
In screen F-1 press/click the "Algorithm" button to enter screen F-1-2.



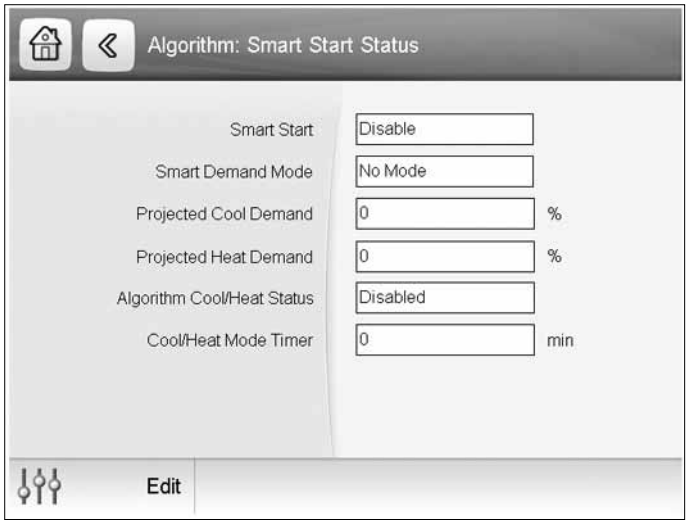
10.1.4.1 - Activate/deactivate and find "Smart Start" status
"Smart Start" allows the NSM to determine the time needed to reach the setpoint temperature configured for each unit at the programmed start time of the occupied period.

If it is activated, the algorithm operates if the first occupied period of the time schedule is after 1.00 a.m.

To activate/deactivate "Smart Start", click on the edit button (at the bottom left) of screen F-1-2 and select "On".



Display of the detailed information requires the Advanced mode. To find the detailed "Smart Start" status, press the information button for "Smart Start".



Four-pipe configuration has two additional status fields.

"Smart start" authorisation
Ths status indicates if "Smart Start" is active or not.

Demand mode
This is the result of the calculation carried out by the NSM, and acts on an operating mode in order to satisfy the first setpoint of the first occupied period.

It can have the following values:

- No mode: the NSM cannot determine a smart start mode for the system. Normally the NSM is not active or the smart start algorithm is not.
- Cooling: the NSM has determined that there is a cooling demand for the water circuit in order to satisfy the first controllers for the first occupied period of the day.
- Heating: the NSM has determined that there is a heating demand for the water circuit in order to satisfy the first controllers for the first occupied period of the day.
- Cooling/heating: in 4-pipe applications only this mode indicates that the heating and cooling demands of the units installed must be satisfied.
- None: the system has not found sufficient reason to anticipate switching on any operating mode.

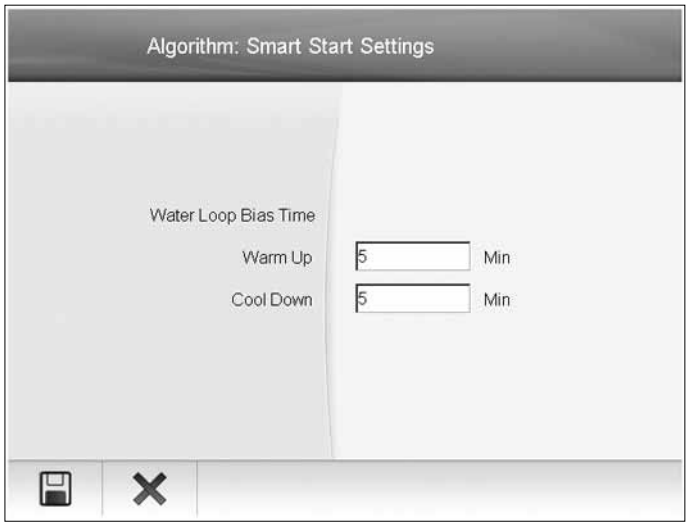
Anticipated heating and cooling demands
These are the ratios between the controllers that will have a cooling or heating demand to reach their occupied setpoint value for the first time schedule period and the total number of controllers. The value is expressed in %.

Cooling/heating algorithm status
This information allows the operator to know where the calculation determination is relative to this algorithm.

It can have the following values:
- Blocked: The NSM has not been activated, the Optimised Start has not been activated or the system mode is No Mode.
- Inactive: The NSM has already determined a reset time for the day, the System Mode is None.
- Search Mode: The NSM is busy calculating a mode, but for the moment there is no dominant demand.
- Maintain Mode: The Smart Start mode is other than None and stays at that value, as the time counters have not completed their count.

Cooling/heating mode delay
Following the selection of the Smart Start mode a time counter or delay is initialised by the corresponding value.
- A - If the Smart Start mode changes to cooling, the counter value will be the same as the delay chosen for the "cooling delay" parameter for the water circuit (5 minutes minimum). During the count of this delay, the Smart Start mode remains in cooling mode and at the end of the count demand selection for each controller is stopped. This only applies from 1.00 a.m. until the beginning of the first occupied period.
- B - If the Smart Start mode changes to heating, the counter value will be the same as the delay chosen for the "heating delay" parameter for the water circuit (5 minutes minimum). During the count of this delay, the Smart Start mode remains in heating mode and at the end of the count demand selection for each controller is stopped. This only applies from midnight until the beginning of the first occupied period.

10.1.4.2 - "Smart Start" parameter setting
To set the "Smart Start" temperature parameters for the water circuit, press/click on the edit button for "Smart Start" in screen F-1-2.



These values in minutes show the time required for the hydronic system to reach the conditions required to trigger the reverse mode, i.e. for the water circuit to change from a cooling temperature (< 15°C) to a heating temperature (> 35°C) or vice versa (heating to cooling).

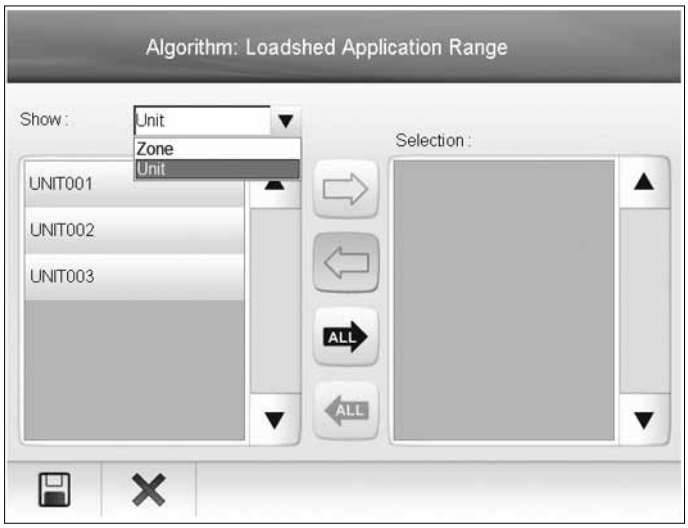
These values are only used when "Smart Start" is active.

These values depend on the correct factors for the system, but they should be estimated at the beginning based on the piping length, the number of terminal units and the capacity at a sudden change from heating to cooling mode by the chiller/heat pump controller.

Example: For a medium-sized system (around 30 terminal units) an reset time of 5-15 minutes is reasonable. The longer the time, the earlier the unit will start up to ensure that the setpoint is reached in the zones at the time when the occupied mode begins.

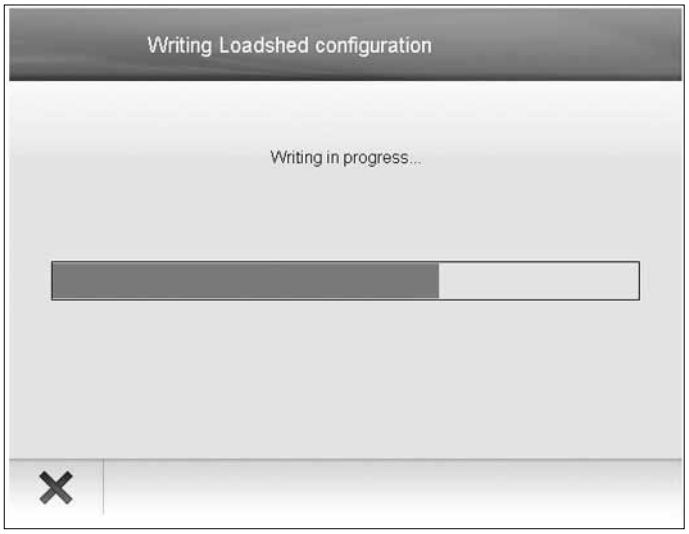
10.1.4.3 - Parameter setting for the terminal unit electric heater unloading
Advanced mode required.

To activate electric heater:
- Go to screen F-1-2.
- Press/click the configuration button for "Loadshed".



Select the zones and/or units concerned.

Press/click the "Save" button. The NSM writes the loadshed authorisation to the selected terminal units.



The loadshed algorithm is activated. To deactivate electric heater unloading:

- Go to screen F-1-2.
- Press/click the configuration button for "Loadshed".
- Do not select any units/zones to unload and save. The NSM writes and prohibits unloading to the terminal units selected.
- The loadshed algorithm is deactivated.

NOTE: A digital input on the NSM must be configured. Depending on the status of this input, the electric heaters of the selected terminal units will be authorised or unloaded.

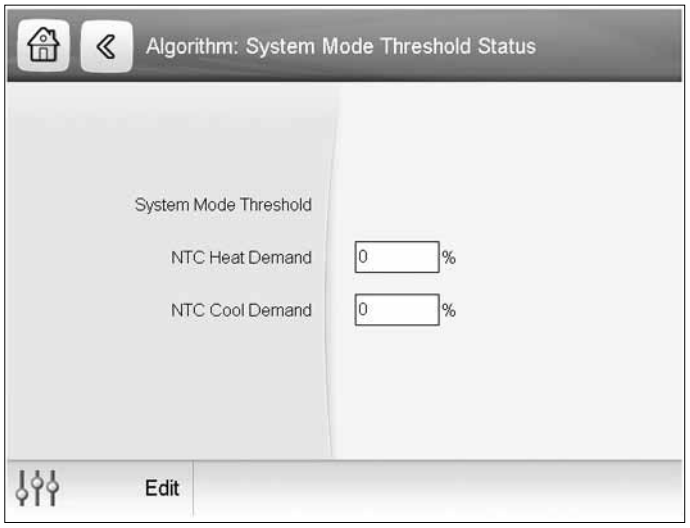
See section 10.1.7.

10.1.4.4 - Modification of the heating/cooling thresholds to calculate the system demand

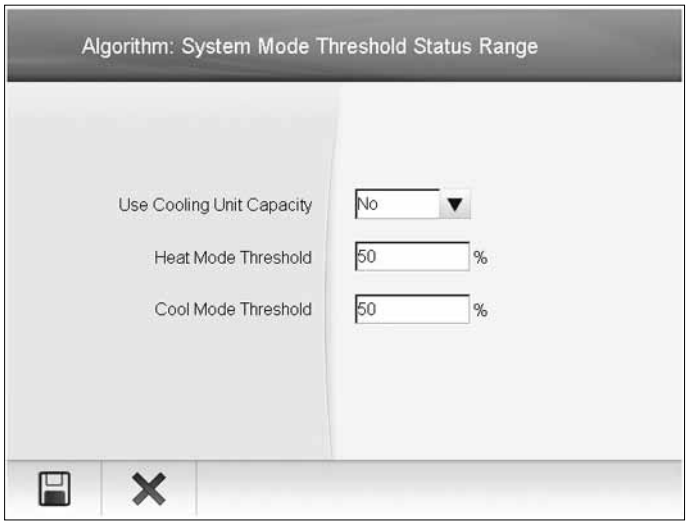
Advanced mode required. The NSM determines the heating and/or air conditioning requirements taking into account the demand of each terminal unit and the configured heating and cooling mode.

To find out the current cooling and heating demand, go to screen F-1-2 and then press/click the information button for "System Mode Threshold".

These demands in percent correspond to the ratio of terminal units in cooling/heating demand compared to the number of terminal units taken into consideration for the calculation (default is all).



To find out the threshold at which the system demand changes to heating mode or to cooling mode press/click the "Edit" button.



If the demand is higher than one of the thresholds, the NSM can control the hot and/or cold water production.

- Limit values: 0 - 100%
- Default value: 50%

Example: If the system includes 26 terminal units and if the cooling mode threshold is fixed at 50%, there must be at least 26 x 0.5 = 13 units in cooling demand before the NSM changes to cooling mode.

The first parameter "Use Cooling Capacity" relates to the terminal units. It allows taking the cooling capacity of each unit into account in order to weight its demand in cooling mode only.

ATTENTION: By default the terminal units are configured with cooling capacities of zero. To use the weighting, this parameter must be re-assigned in each NTC controller.

10.1.4.5 - Taking only certain units into account for the heating and cooling demand

To select the units to be taken into account for heating and cooling demand, click on the edit button (at the bottom left) of screen F-1-2.

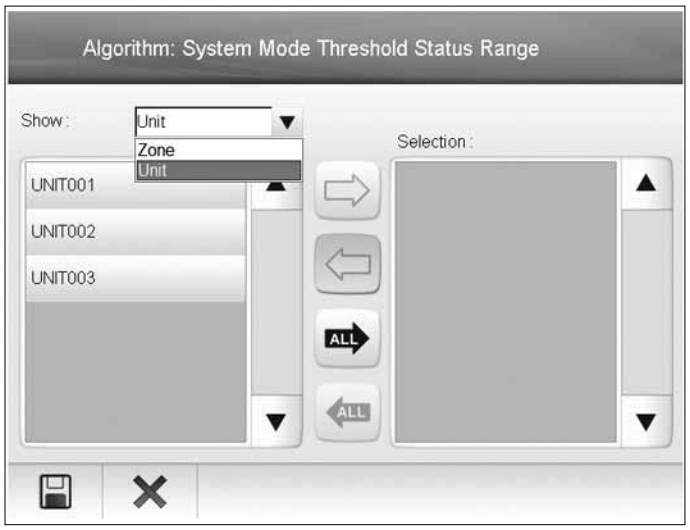
Two modes are authorised:

- The default mode to carry out the system demand calculation with all terminal units.
- The custom mode to carry out the system demand calculation with selected terminal units.

Save the selection.

In the "Custom" mode and in the Advanced mode a configu-ration button appears for the "System Mode Threshold" next to the information button:

To select the units to be taken into account for the system demand calculation press/click this button.



Select the zone(s) and unit(s) to be taken into account in the left-hand list and move them with the arrow buttons to the right-hand list. Save the selection.

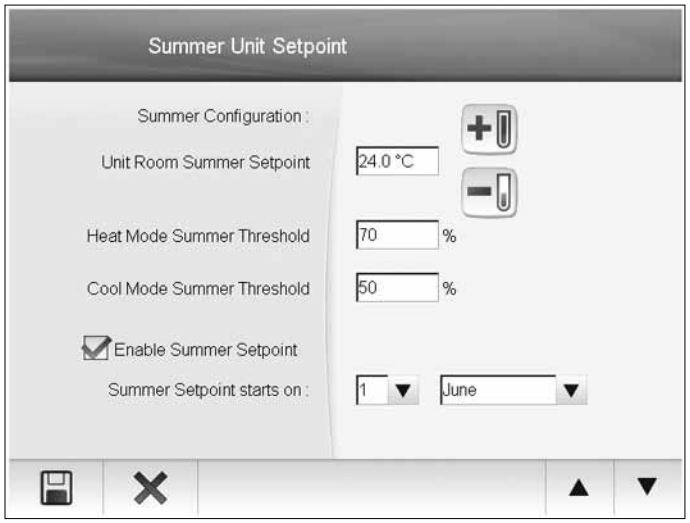
10.1.5 - Find and configure the summer/winter temperature setpoints (screen F-1-4).
Advanced mode required for a modification.

In screen F-1 press/click "Winter/Summer setpoint" button (screen F-1-4).

This screen permits changing the summer setpoint of all terminal unit controllers to a fixed date. It also permits modifying the threshold for the heating/cooling system demand at that date. This automatic function is not active, if the "Enable …" tick box is not ticked (default selection).

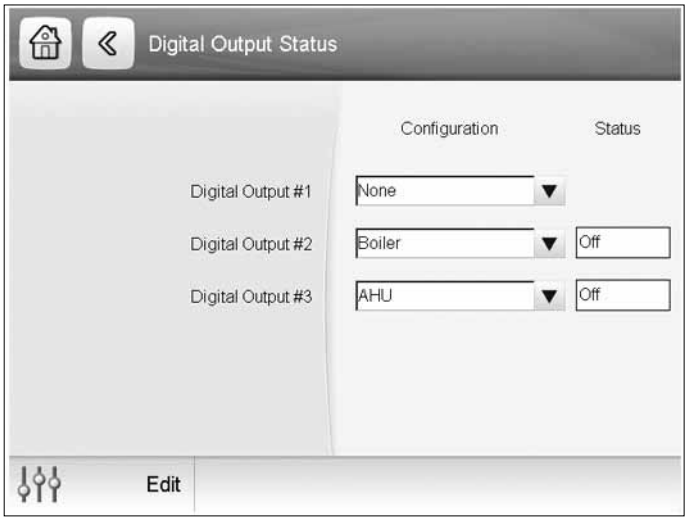
The up/down arrows allow display/modification of the same parameters for the winter period.

ATTENTION: The summer or winter configuration is only transmitted on the configured day.

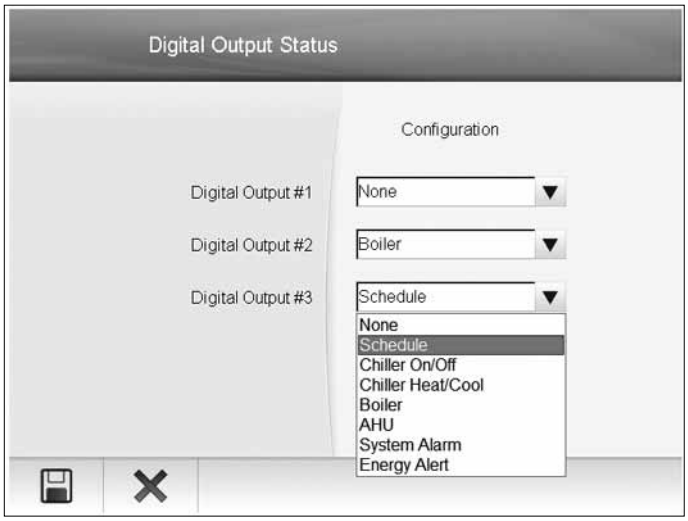


10.1.6 - Find and configure the digital outputs (screen F-1-5)
Advanced mode required for a modification.

The NSM can control up to three digital outputs. In screen F-1 press/click the "Digital outputs" button (screen F-1-5).

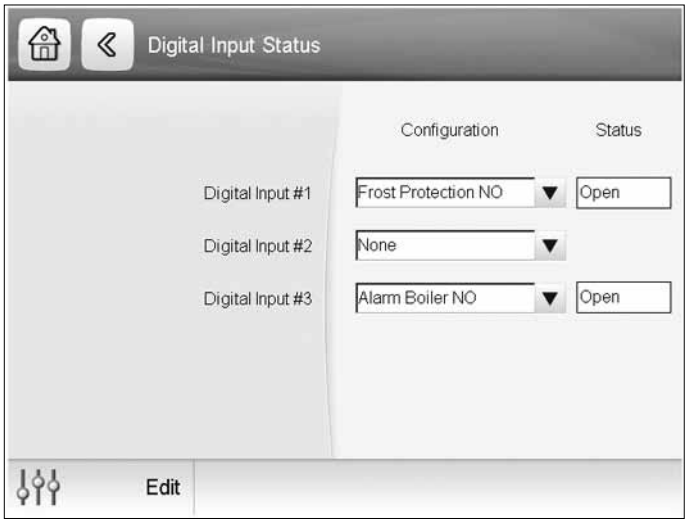


The current status of the output is indicated in the "Status" column. Press/click the "Edit" button to modify the configuration of the digital outputs. It is recommended to stop the system before modifying the assignment of the digital outputs. These are reset to the "Off" (open) status, if their assignment is modified. See section 6.2.13.



10.1.7 - Find and configure the digital inputs (screen F-1-6)
Advanced mode required for a modification.

The NSM includes three digital inputs. In screen F-1 press/click the "Digital inputs" button (screen F-1-6). See section 6.2.13.



The current input status is indicated in then"Status" column.

Press/click the "Edit" button to modify the configuration of the digital inputs.

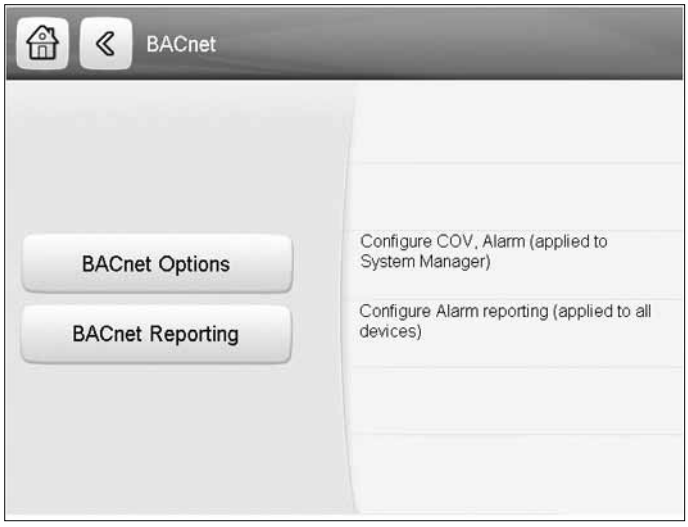
10.1.8 - Configuration of the BACnet interface (NSM only)
Advanced mode required.

It is recommended to refer to chapter 16 for more information about the BACnet IP interface supported by the Aquasmart system.

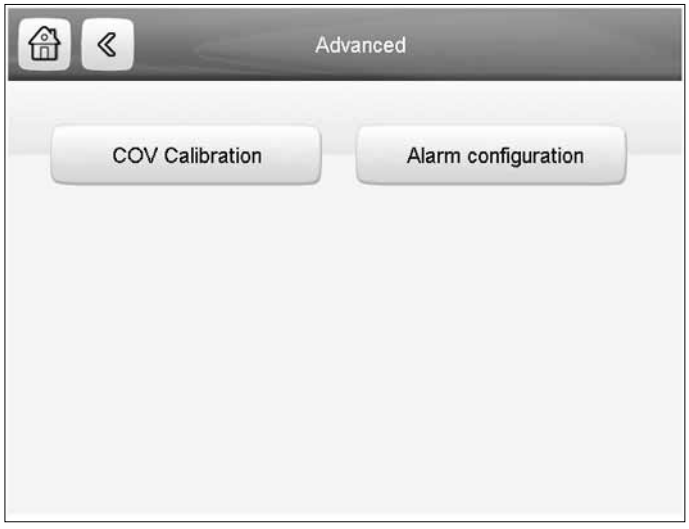
In screen F-1, press/click the "BACnet" button to get to screen F-1-7 below.

The "BACnet Options"button gives access to the COV (Change of Value) option configuration and the "Intrinsic Reporting"alarm option.

The "BACnet Reporting" button allows specification of the equipment to be notified if an alarm is detected or there is a status change.



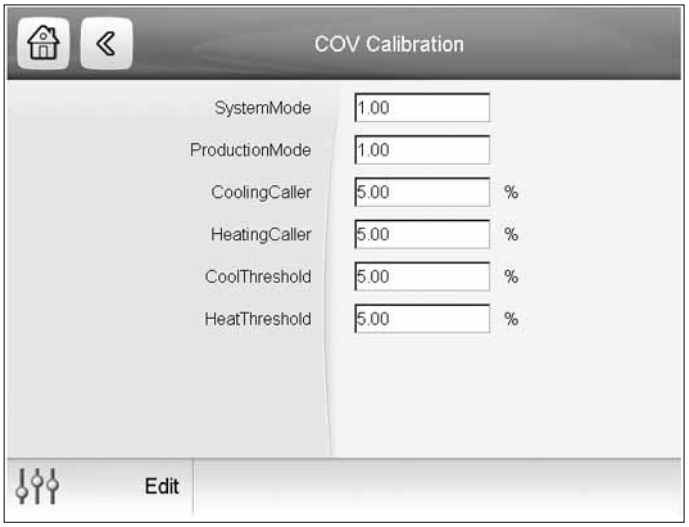
10.1.8.1 - Configuration of the COV (Change of Value)
In screen F-1-7, press/click the "BACnet Options" button.



Press/click the "COV calibration" button to display the values of the objects that support the COV option. For the NSM all objects support this option, but only the COV of "Analogue value" object types can be configured from this screen:

- "SystemMode": NSM operating mode.
- "ProductionMode": NSM production mode.
- "CoolingCaller": Terminal unit percentage in cooling demand.
- "HeatingCaller": Terminal unit percentage in heating demand.
- "CoolThreshold": Threshold from which the system demand changes to cooling mode.
- "HeatThreshold": Threshold from which the system demand changes to heating mode.

The values below are default values and can be modified.



Pressing/clicking the "Edit" button authorises the configuration modification.

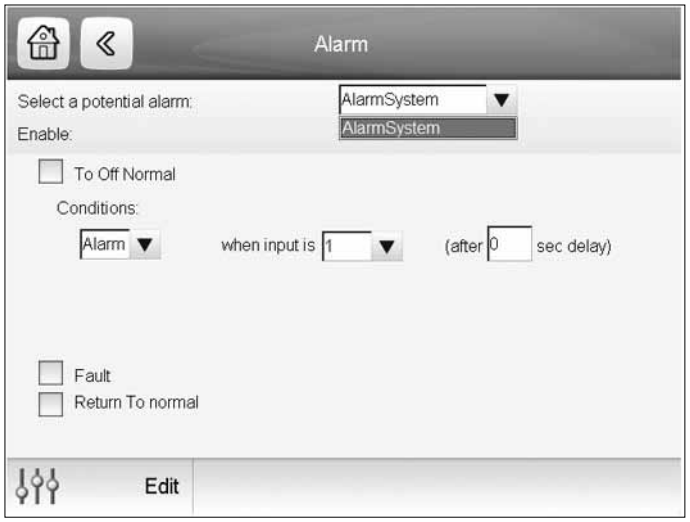
IMPORTANT:

- ***Saving the COV configuration will only be effective if it is done from the NSM screens.***
- ***The equipment that is to be notified if a variation of these values exceeds the configured values must periodically be linked to the associated BACnet service, as this information will be lost in case of a power cut or restart of the unit.***

10.1.8.2 - Configuration of the alarms (Intrinsic reporting)
Reserved to the Advanced mode.

In the previous screen (F-1-7), press/click the "Alarm Configuration" button to display the configuration of the objects that support the "Intrinsic reporting" option.

For the NSM only one object supports this option: "AlarmSystem": indicates if an alarm is present on at least one of the CCN units.



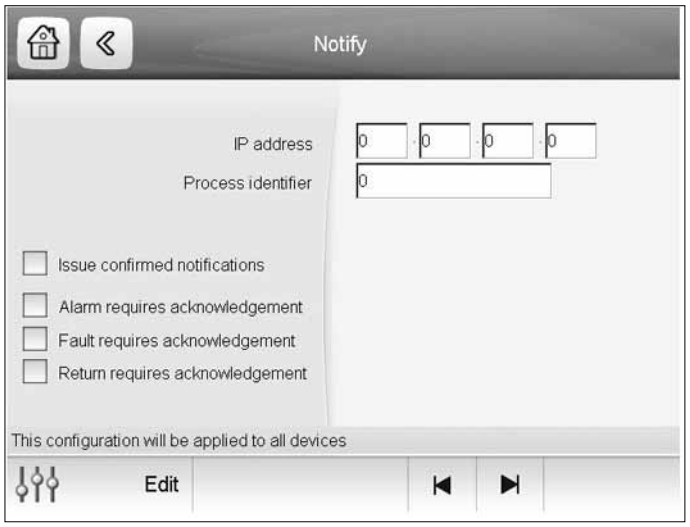
IMPORTANT: Saving the alarm configurations will only be effective if it is done from the NSM screens.

Please refer to chapter 13.8.1.2 for more information about the configuration of this option.

10.1.8.3 - Configuration of the alarm notification
In screen F-1-7 press/click the "BACnet reporting" button.

The equipment that will receive the alarm notifications must be known by the system. This is usually the building management system.

Its IP address and the identifier of the process dealing with the BACnet notification must be registered in the NSM as shown on the screen below.



IMPORTANT: This configuration applies to all Aquasmart system equipment.

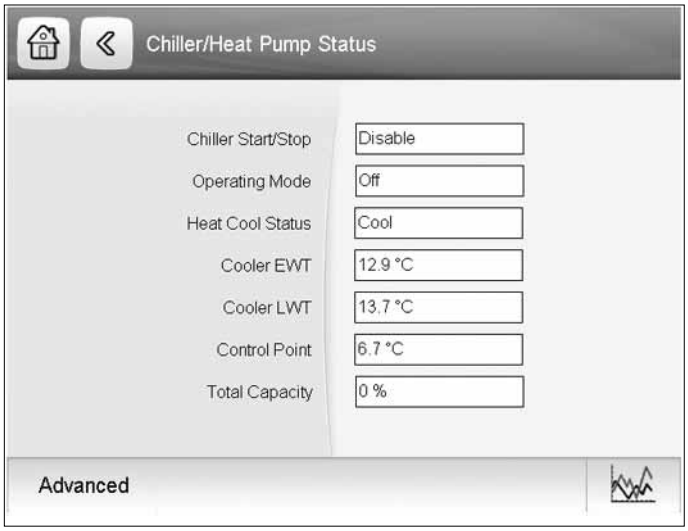
IMPORTANT: Saving the alarm notification configuration will only be effective if it is done from the NSM screens.

Please refer to chapter 13.8.1.3 for more information about the alarm notification configuration.

10.2 - Find the chiller/heat pump status (screen F-2)

The chiller/heat pump may be a CCN or a non-CCN unit. If it is CCN (equipped with a Carrier Pro-Dialog control), the information available is much more comprehensive.

10.2.1 - CCN chiller/heat pump status
In the "Production" screen (screen F) press/click the "Chiller/HeatPump" button.



NOTE: The "Advanced" button is only available in the Advanced mode.

"Chiller Start/Stop" control status
This variable displays the chiller/heat pump control status.
- Active: the chiller/heat pump is authorised to start.
- Inactive: the chiller/heat pump is not or no longer authorised to start.

Chiller/heat pump "Operating Mode"
This variable displays the current status of the unit.
- Available: The chiller/heat pump is ready and waiting for a command via the CCN network.
- Running: The chiller/heat pump has received a command to start and is currently operational.
- Unavailable: The chiller/heat pump is either in alarm condition or not available for the CCN network.
- Start-up: The chiller/heat pump is in the start-up phase.
- Fault: Alarms or alerts prevent equipment operation.
- Communication problem: The NSM no longer communicates with the equipment via its CCN bus.

Heating/cooling mode "Heat/Cool Status"
This variable indicates the current unit operating mode.
- None: The chiller/heat pump has stopped all compression stages and kept the water circuit pump operating to ensure a better heat exchange with the terminal units.
- Cooling: The chiller/heat pump controls around its cooling setpoint. All automated functions (safety, operating sequence) are regulated by the Pro-Dialog control.
- Heating: The chiller/heat pump controls around its heating setpoint, if the unit is a reversible unit. All automated functions (safety, operating sequence) are regulated by the Pro-Dialog control.
  If the unit is a chiller, the control relays the heating demand via its on/off output to a boiler.

- Cooling/heating: This is only possible with a four-pipe configuration. Depending on the configuration of the chiller/heat pump, the control ensures operation in cooling mode and automatically activates the digital output to signal to the boiler that it can also start.

Entering and leaving water temperatures "EWT/LWT"
These variables allow the display of the equipment entering water (EWT) and leaving water temperatures (LWT).

"Control Point"
This is the set point the unit will attempt to reach.

"Total Capacity"
This is the number of operating compressors compared to the total number of compressors available in the unit.

10.2.2 - Configuration of the BACnet interface for the chiller/heat pump
Advanced mode required.

It is recommended to refer to chapter 16 for more information about the BACnet IP interface supported by the Aquasmart system.

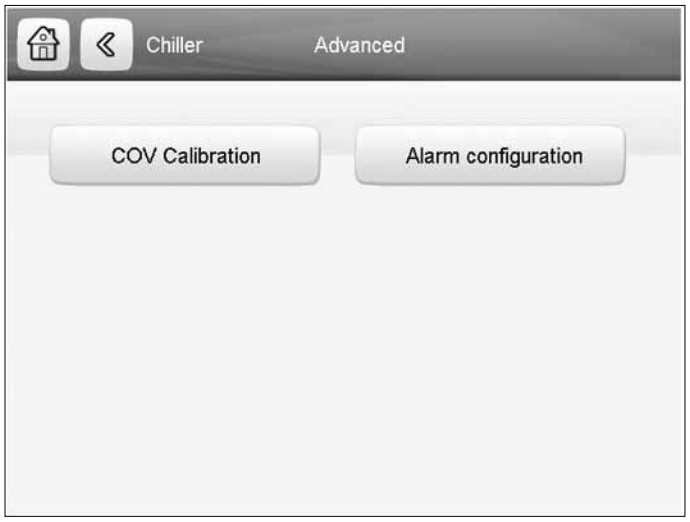
In screen F-2, press/click the "Advanced" button to get to screen F-2-1 below.

The "BACnet Options" button gives access to the "COV" option configuration and the "Intrinsic Reporting" alarm option.

The "BACnet Reporting" button allows specification of the equipment to be notified if an alarm is detected or there is a status change.

Advanced Chiller Menu
BACnet Options
Configure COV, Alarm (applied to chiller/heat pump)
BACnet Reporting
Configure Alarm reporting (applied to all devices)

10.2.2.1 - Configuration of the "COV" values
In screen F-2-1, press/click the "BACnet Options" button.

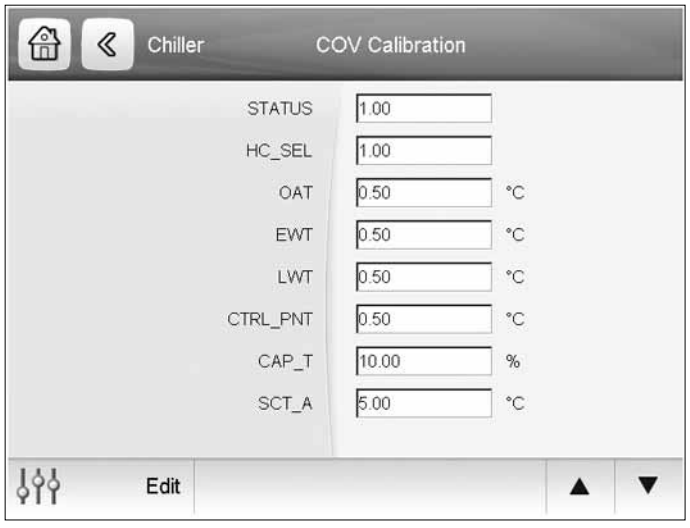


Press/click the "COV calibration" button to display the values of the objects that support the "COV" option.

For the chiller/heat pump, seven objects support this option:

CAP_T	Total capacity from 0 to 100%
CTRL_PNT	This is the setpoint the unit tries to reach
LWT	Leaving water temperature
EWT	Entering water temperature
OAT	Outdoor air temperature
HC_SEL	This variable shows the requested operating mode (heating/cooling)
STATUS	Chiller/heat pump operating mode "Operating Mode"

The values below are the default values and can be modified.



Pressing/clicking the "Edit" authorises the configuration modification.

IMPORTANT:
- ***Saving the COV configuration will only be effective if it is done from the NSM screens.***
- ***The equipment that is to be notified if a variation of these values exceeds the configured values must periodically be linked to the associated BACnet service, as this information will be lost in case of a power cut or restart of the unit.***

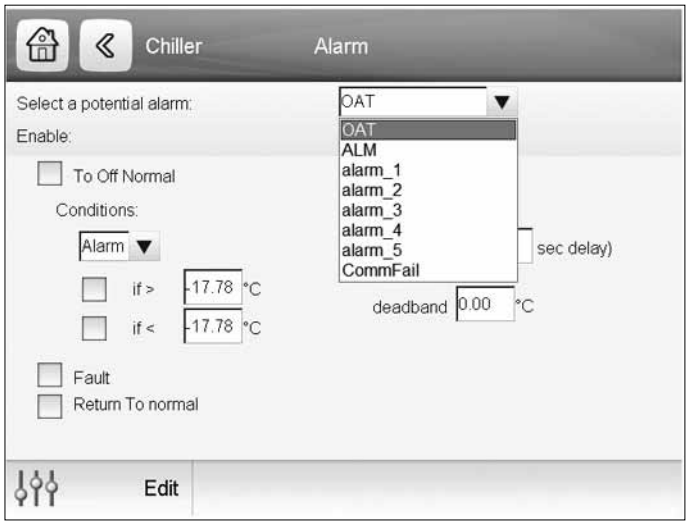
10.2.2.2 - Configuration of the alarms (Intrinsic reporting)

Press/click the "Alarm Configuration" button to display the configuration of the objects that support the "intrinsic reporting" option.

For the chiller/heat pump, four objects support this option:

OAT	Outdoor air temperature
ALM	Indicates if an alarm is present
alarm_1, …, alarm_5	Code of the alarms present on the unit
Commfail	Communication status with the NSM (normal/fail)

The configuration screen is as follows:



IMPORTANT: Saving the alarm configuration will only be effective if it is done from the NSM screens.

Please refer to chapter 13.8.1.2 for more information about the alarm notification configuration.

10.2.2.3 - Configuration of the alarm notification

In screen F-2-1 press/click the "BACnet reporting" button.

The equipment that will receive the alarm notifications must be known by the system. This is usually the building management system.

Its IP address and the identifier of the process dealing with the BACnet notification must be registered in the NSM as shown on the screen below.

IMPORTANT: This configuration applies to all Aquasmart system equipment.

IMPORTANT: Saving the alarm notification configuration will only be effective if it is done from the NSM screens.

See to chapter 13.8.1.3 for more information about this option.

10.2.3 - Chiller operating history

The NSM includes a data collection tool. All pre-defined points are collected every five minutes and saved in a .csv file. At the beginning of every week (Sunday at 0.00 hours) a new file is created. The data for the finished week is now available until the end of the current week and is then deleted. To access the trending curves press/click on the button in screen F-2.

The screen below is now displayed with the list of pre-defined points for the chiller or heat pump.

Chiller Trending
- 1/2
Outside Air Temp °C -20 40
Entering Water Temp °C 0.0 60
Leaving Water Temp °C 5 60
Control Point °C 5 60
Chiller Start Stop 0 1
Heat Cool Select 0 2
Total Capacity % 0 100

From the pre-defined points select the trending curves to be displayed:

- Press/click the high and low scale limits to modify them.
- Press/click the corresponding colour to modify it.
- Press/click the "Next" button to show the selected curves.

NOTE: It may take 20 or 30 seconds to load the curves from the touch screen. It will not take longer than a few seconds from a PC browser.

For the explanation of the buttons refer to sheet 1 at the beginning of this document.

Each trending curve is displayed with its scale in the same colour. The time and date are given for information only.

Press/click the @ button to send an e-mail to the configured recipients.

Pressing/clicking on the display of the curves allows inserting a marker (vertical line in green colour).

Once a marker has been inserted, the values of the displayed points at time T (given by the marker) can be seen on the previous screen.

Press the button "Back" to return to the previous screen and see the values of the selected points.

Chiller Trending
- 1/2
Outside Air Temp 21.5 °C 08:57:32 14.06.2011 -20 40
Entering Water Temp 11.0 °C 08:57:32 14.06.2011 0.0 60
Leaving Water Temp 9.0 °C 08:57:32 14.06.2011 5 60
Control Point * °C * 5 60
Chiller Start Stop * * 0 1
Heat Cool Select * * 0 2
Total Capacity 25.0 % 08:57:32 14.06.2011 0 100

10.2.4 - Non-CCN chiller/heat pump status

Start/stop control of the non-CCN chiller/heat pump - "Non-CCN Chiller Status"
This control status indicates if the NSM requests operation of shut-down of the chiller/heat pump.

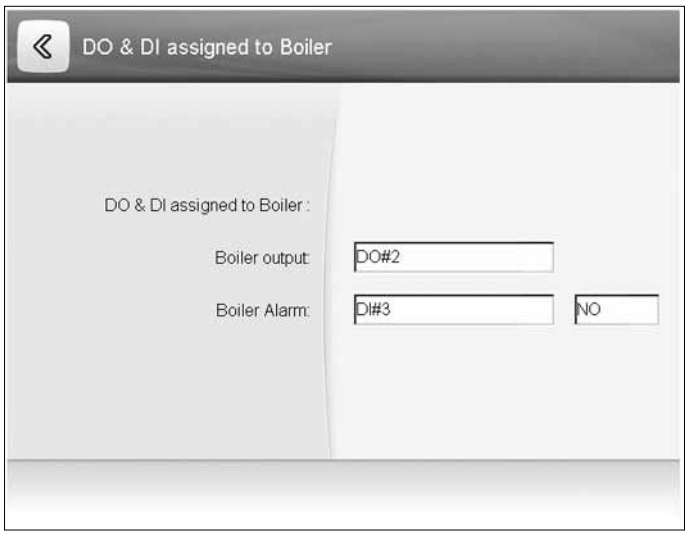
"Heat/Cool command"
This control status indicates whether the installation is in heating or cooling demand.

"Non-CCN Chiller in alarm"
This control status indicates if the chiller/heat pump is in alarm status. If no digital input is configured for the chiller/heat pump alarm, this information is not available.

10.3 - Find the boiler status (screen F-3)

To access this information a boiler must have been configured in the system.

Press/click on the "More" button to see which digital output controls the boiler and which input (optional) allows restoring its alarm status:

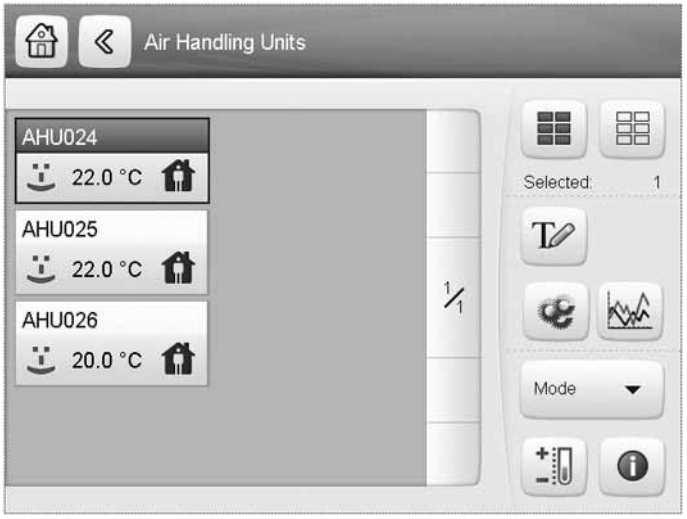


10.4 - Find the status of the air handling unit (screen F-4)

The air handling unit may be a CCN or a non-CCN unit. If it is CCN, the information available is much more comprehensive.

10.4.1 - CCN air handling unit status

In the "Production" screen (screen F) press/click the "Air Handling Unit" button (screen F-4).



The air handling units present are displayed by page showing 8 pages and listed in alphabetical order.

In the right-hand band the page number is displayed together with the total number of pages.

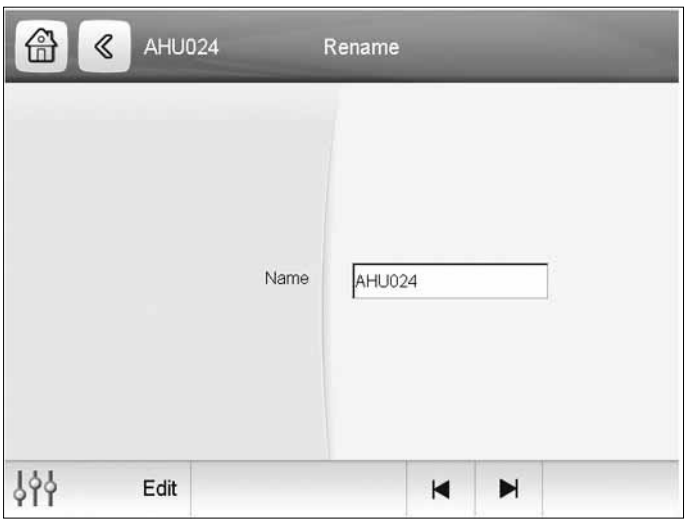
For each unit the setpoint, operating mode and occupancy period are shown. A maximum of eight AHUs can be shown.

To select/deselect an air handling unit on the page, press/click on a name. If an air handling unit is selected, the right-hand buttons are operational. If the buttons are greyed out, they are not operational.

For the explanation of all buttons refer to sheet 1 at the beginning of the document.

10.4.1.1 - Rename an air handling unit (screen F-4-1)

In screen F select the air handling unit to be renamed and press/click button



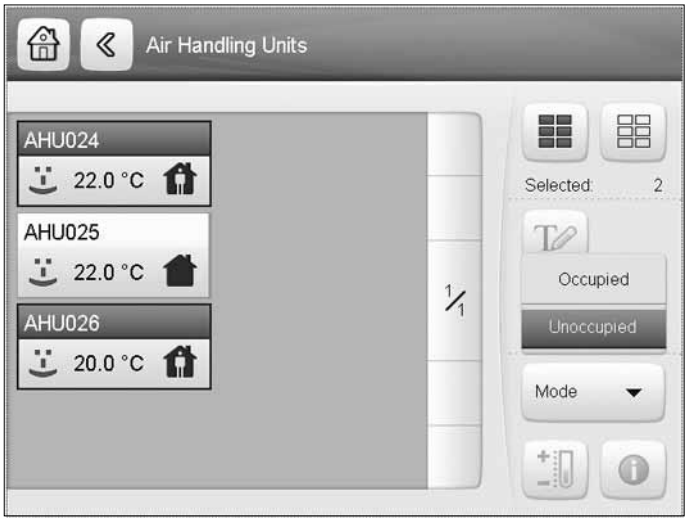
Press/click the "Edit" button and enter the new name (12 characters maximum) and save.

The navigation keys in the lower band allow display and possible renaming of the following or preceding unit.

NOTE: The name of the air handling units is listed in alphabetical order. This order will only become effective after the NSM has been restarted (see section 8.3).

10.4.2 - Change the occupancy mode of an air handling unit (F-4-5)

In screen F-4 select the unit or units for which the mode needs to be changed.



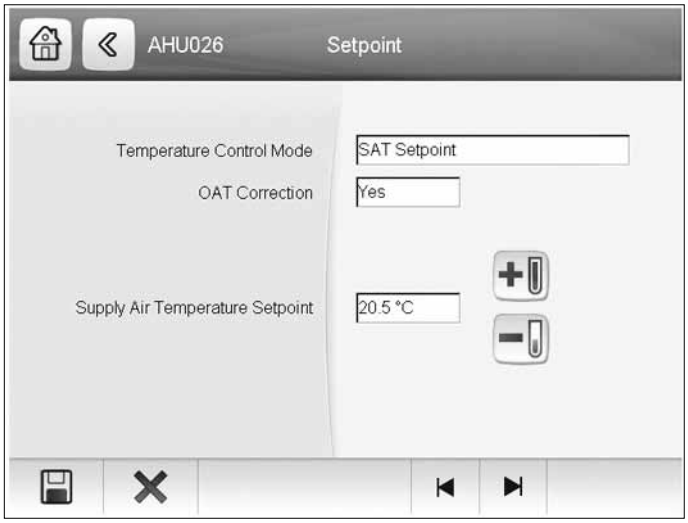
Press the "Mode" button to select the new mode to be applied (occupied, unoccupied) in the scroll-down list.

- Occupied: The air handling units selected are changed to occupied mode.
- Unoccupied/Economy: The air handling units selected are changed to unoccupied mode.

NOTE: The unit occupied or unoccupied commands can then be modified by a command from the user interface or a time schedule.

10.4.3 - Modify an air handling unit setpoint (screen F-4-3)

In screen F-4 select the unit concerned and click button



The two sets of information at the top of the screen can be modified. The first shows the user the setpoint that is used for the air handling unit, namely:

- setpoint at the sensor located at the supply side,
- setpoint at the sensor located at the extract side,
- setpoint at the room air sensor.

The second parameter indicates if a correction has been applied to this setpoint, based on the outside air temperature.

Modify the setpoint using buttons and .

Save the modification using the "Save" button.

NOTE: The setpoint is only transmitted to the air handling unit after saving. There is no regular setpoint transmission. Saving does not take place when a "writing in progress" screen appears.

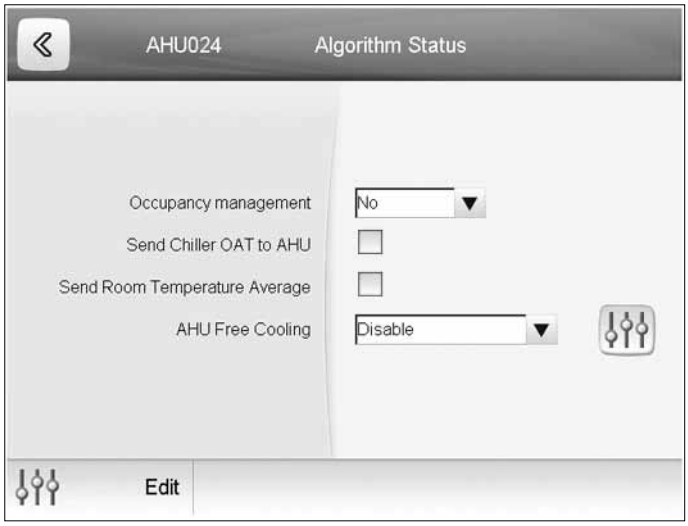
The navigation keys in the lower band allow display and possible modification of the setpoint of the following or preceding unit.

10.4.4 - Configuration of the algorithms for the air handling unit (screen F-4-2-1)

In screen F select the unit concerned and click button

The following screen is used to activate:

- the algorithm for occupancy mode management of the air handling unit,
- transmission of the outside temperature (if available) from the chiller/heat pump to the air handling unit,
- calculation and transmission of the average room temperatures at the controllers that belong to the same zone(s) to the air handling unit.
- the free cooling algorithm of the air handling unit.



Algorithm for occupancy mode management of the air handling unit ("Occupancy Management")

The terminal units taken into consideration for this algorithm are those belonging to the same zone(s) as the air handling unit.

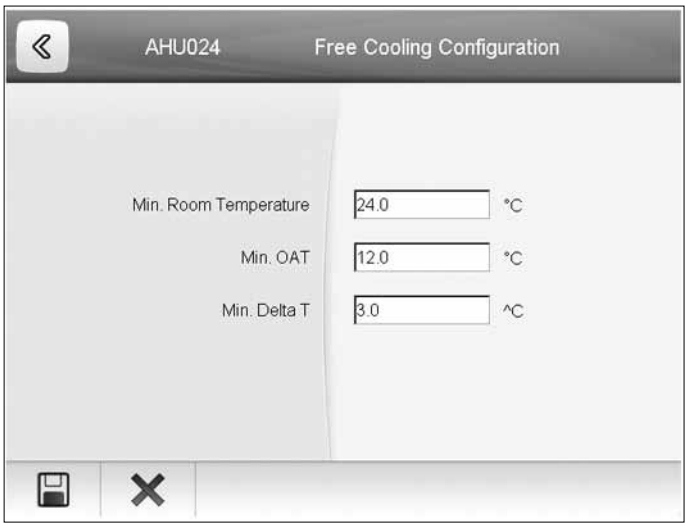
- The air handling unit and the terminal units are in unoccupied mode: if one of the terminal units goes to occupied mode, the NSM sends an occupancy order to the air handling unit.
- The air handling unit is in occupied mode: if all terminal units are in unoccupied mode and the time schedule(s) applicable to the air handling unit are in an unoccupied period the NSM sends an non-occupancy order to the air handling unit.

Free-cooling algorithm

- The NSM allows only the free-cooling mode. The air handling unit activates it, if the conditions are correct.

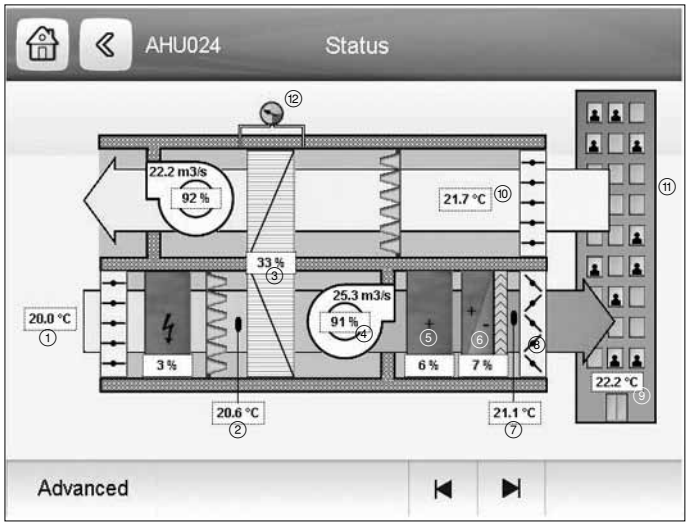
Pressing button allows configuration of the free-cooling algorithm parameters for the air handling unit. If one of these conditions is not satisfied, the air handling unit will exit the free-cooling mode:

- minimum room temperature,
- minimum outside temperature value,
- minimum difference between the room temperature and the outside temperature.



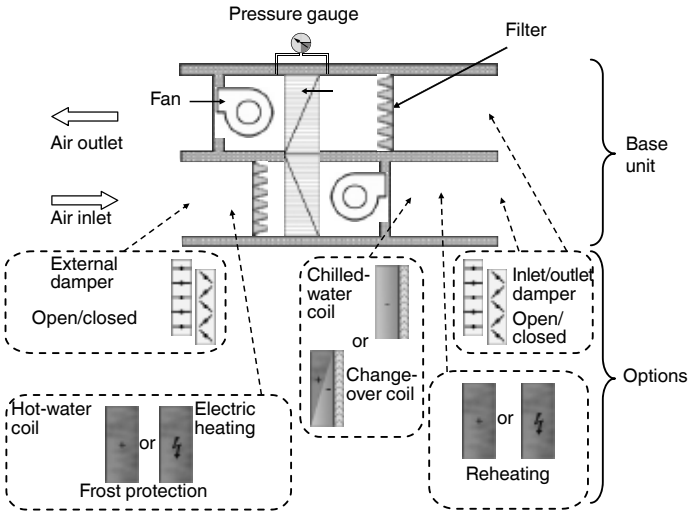
10.4.5 - Status of an air handling unit (screen F-4-4)

In screen F select the air handling unit for which information is required and click button



Legend

1 Outside air temperature
2 Heat recovery coil entering air temperature
3 Heat recovery command
4 Fan air flow rate and command
5 Reheater command
6 Cooling command
7 Supply air temperature
8 Damper status (open/closed)
9 Indoor air temperature
10 Leaving air temperature
11 Occupancy status
12 Pressure gauge



The buttons allow the display of the parameters for the previous or next unit.

NOTE: The "Advanced" button is only available in the Advanced mode.

10.4.6 - Configuration of the BACnet interface for the air handling unit

Advanced mode required.

It is recommended to refer to chapter 16 for more information about the BACnet IP interface supported by the Aquasmart system.

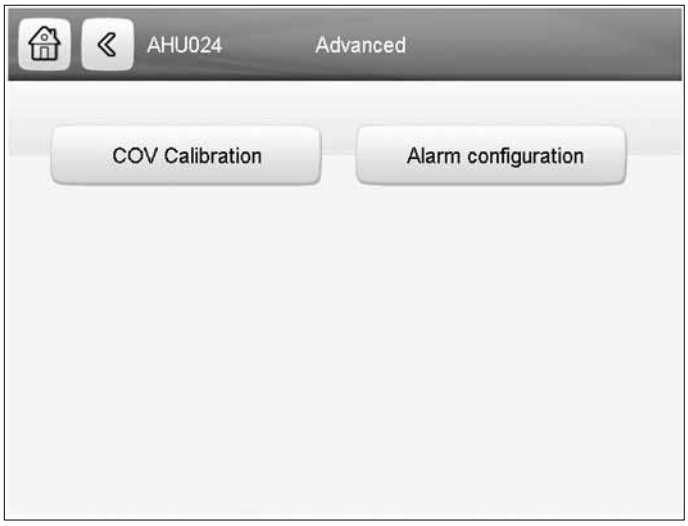
In screen F-4-4, press/click the "Advanced" button to get to screen F-4-4-2 below.

The "BACnet Options" button gives access to the "COV" option configuration and the "Intrinsic Reporting" alarm option.

The "BACnet Reporting" button allows specification of the equipment to be notified if an alarm is detected or there is a status change.

10.4.6.1 - Configuration of the COV values

In screen F-4-4-2 press/click the "BACnet Options" button.

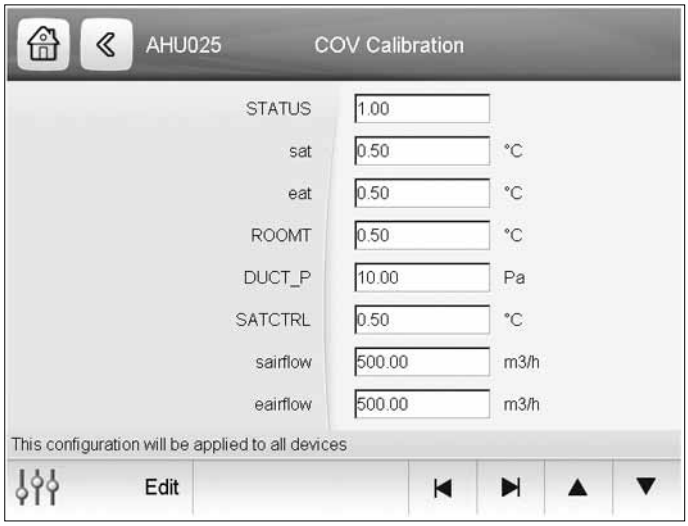


Press/click the "COV calibration"button to display the values of the objects that support the COV option.

For the air handling unit(s) all objects support this option, but only the COV of "Analogue value" object types can be configured from this screen:

The description of the BACnet objects is given in chapter 16.3.4.

The values below are the default values that can be modified. They apply to all air handling units.



Pressing/clicking the "Edit" authorises the configuration modification.

IMPORTANT:

- ***Saving the COV configuration will only be effective if it is done from the NSM screens.***
- ***The equipment that is to be notified if a variation of these values exceeds the configured values must periodically be linked to the associated BACnet service, as this information will be lost in case of a power cut or restart of the unit.***

10.4.6.2 - Configuration of the alarms (Intrinsic reporting)

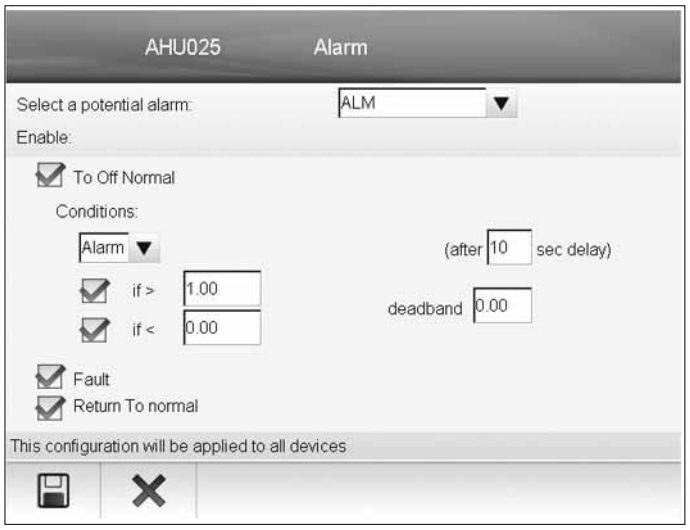
Press/click the "Alarm Configuration" button to display the configuration of the objects that support the "intrinsic reporting" option.

For the air handling unit(s) seven objects support this option:

ALM	Indicates if an alarm is present
alarm_1, …, alarm_5	Code of the alarms present on the AHU
Commfail	Communication status with the NSM (normal/fail)

Please refer to chapter 13.8.1.2 for more information about this option.

The configuration screen is as follows:



IMPORTANT: This configuration applies to all Aquasmart system air handling unit equipment.

IMPORTANT: Saving the alarm notification configuration will only be effective if it is done from the NSM screens.

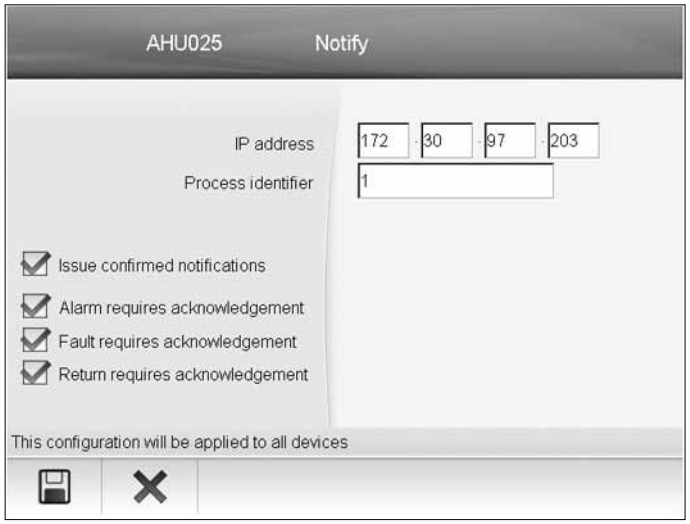
Please refer to chapter 13.8.1.2 for more information about this option.

10.4.6.3 - Configuration of the alarm notification

In screen F-3-4-2 press/click the "BACnet reporting" button.

The equipment that will receive the alarm notifications must be known by the system. This is usually the building management system.

Its IP address and the identifier of the process dealing with the BACnet notification must be registered in the NSM as shown on the screen below.



IMPORTANT: This configuration applies to all Aquasmart system equipment.

IMPORTANT: Saving the alarm notification configuration will only be effective if it is done from the NSM screens.

See chapter 13.8.1.3 for more information about this option.

10.4.7 - Air handling unit operating history

To access the trending curves, select an air handling unit and press/click on the button in screen F-4.

The screen below is now displayed with the list of pre-defined points for the air handling unit(s). The trending curves to be displayed can be selected:

AHU024
Trending
- 1/2
Outside Air Temp °C -20 40
Supply Air Temp °C 5 40
Extract Air Temp °C 5 40
Room Air Temp °C 5 40
Duct Pressure Pa -50 500
Control Supply Temp °C 5 40
Supply Air Flow m3/h 0 18000
Extract Air Flow m3/h 0 18000

Refer to chapter 10.2.3, as the configuration for displaying the trending curves for the air handling units follows the same description.

NOTE: On the display screen for the trending curves the buttons

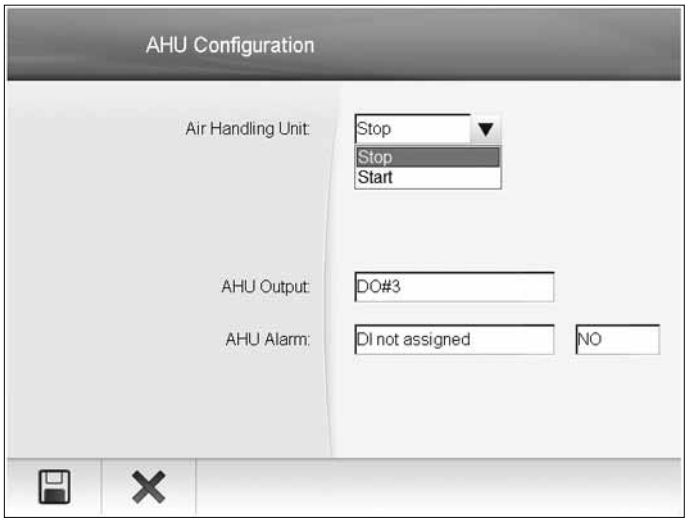
will display the curves for the previous or next air handling unit.

10.4.8 - Status and control of the non-CCN air handling unit

To access this information an air handling unit must have been configured in the system.

Press/click the "Edit" button to:

- access stop or start for the AHU,
- see which digital output controls the AHU and which input (optional) allows restoring its alarm status.



The AHU can be stopped and started from this screen, if the control is not linked to a time schedule. If this is the case there could be interaction.

11 - ZONE MANAGEMENT (SCREEN D)

In the welcome screen press/click the "Zones" button to go to screen D.

The zones created are displayed by page showing 8 pages and listed in alphabetical order.

In the right-hand band the page number is displayed together with the total number of pages. If the page number is higher than one, the up/down buttons are displayed. They allow the display of the previous or next page.

Pressing button "x2" allows the display of the page following the next or previous page.

The setpoint and the occupied period are shown for each zone. A maximum of 128 zones can be created.

To select/deselect a "Zone" in the page, press/click on a name. If a zone is selected, the right-hand buttons are operational. If the buttons are greyed out, they are not operational.

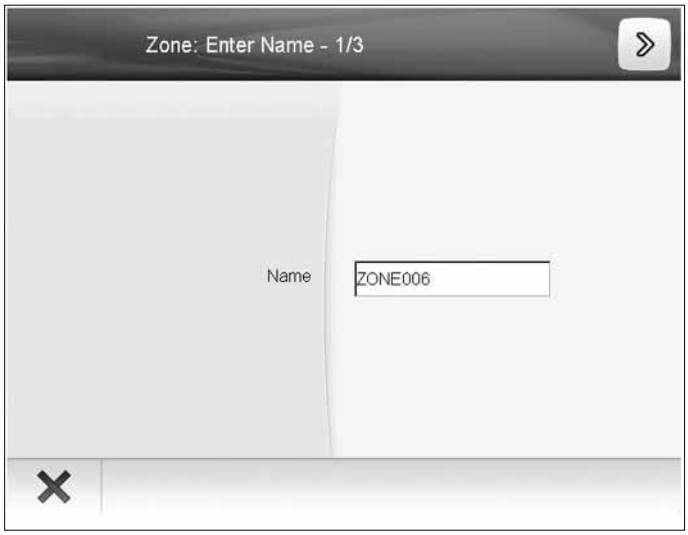
For the explanation of all buttons refer to sheet 1 at the beginning of the document.

11.1 - Create a zone (screen D-1)

Advanced mode required.

In screen D do not select any zone and press/click button

Enter the name of the zone to be created and validate it to move to the next step.

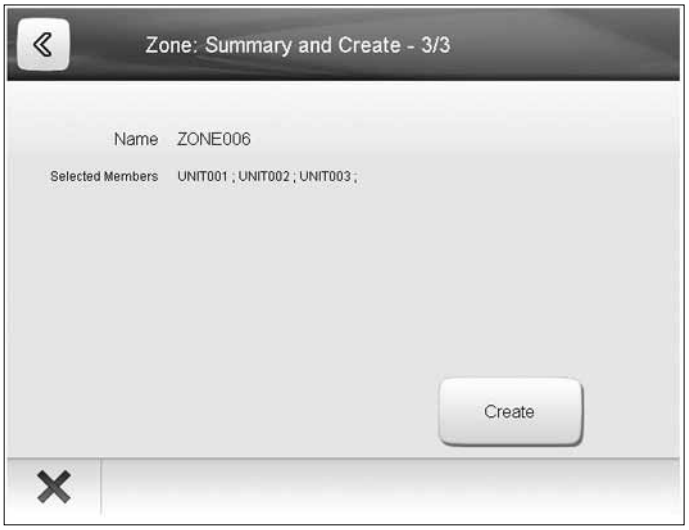


Then select the units and/or digital outputs and/or CCN air handling units that will be members of the zone in the left-hand list and move them to the list of members of the zone (right-hand list).

Finally verify the zone to be created and press/click the "Create" button to add this zone to the database.

ADVICE: The terminal units must be regrouped based on common factors to allow management of several units together. These units must satisfy the same constraints: exposure in the building, setpoint, time schedule, loadshed management, master/slave configuration.

In the same way the air handling units (AHUs) are grouped in the same zone(s) as the terminal units to which they supply air.



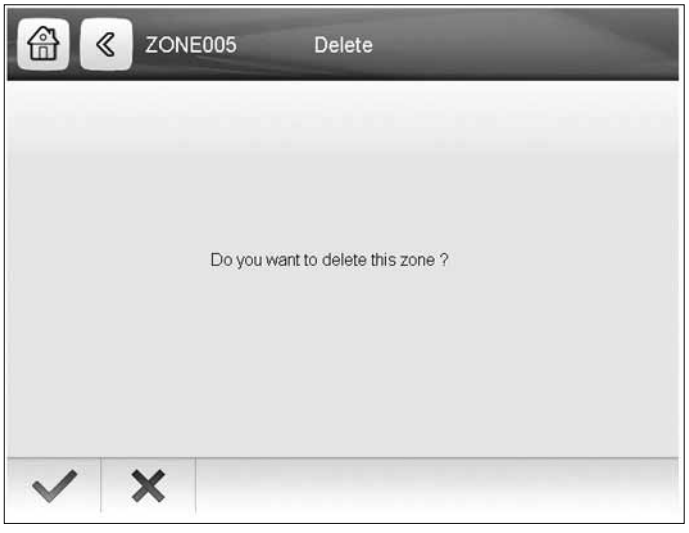
The zone created is now in the list of existing zones.

NOTE: One unit can belong to several zones. A zone is not necessarily linked to a time schedule. A unit can for example belong to a zone dedicated to loadshed management and to a zone linked to a time schedule.

11.2 - Delete a zone (screen D-2)

Advanced mode required.

In screen D select the zone to be deleted and press/click button



A message requests confirmation of the deletion. Press/click the "Yes" button to delete the zone.

11.3 - Copy setpoint parameters from one zone to another zone (screen D-4)

Advanced mode required.

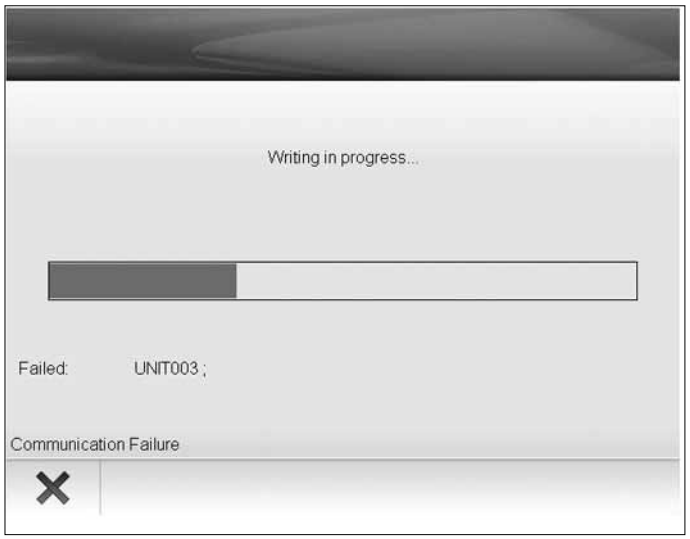
This screen is available if the zone includes one or several terminal units.

This function permits copying all setpoint parameters of a zone to one or more zones already created. This function does not copy the occupancy mode nor the members of the zone.

In screen D select the zone to be copied and press/click button

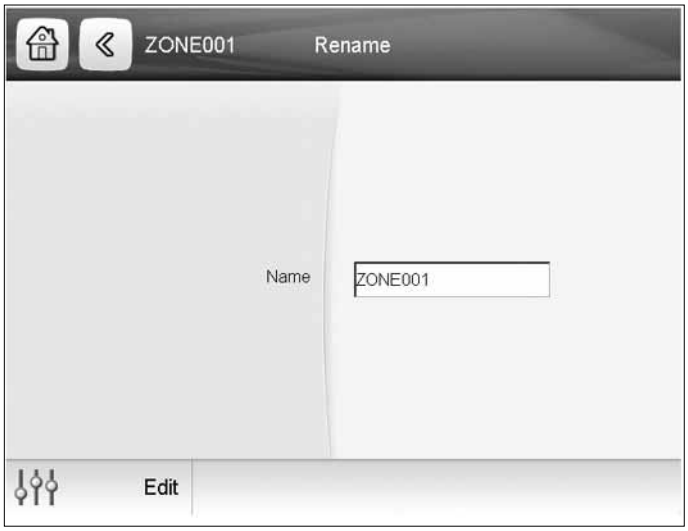
The name of the zone to be copied is shown in the top band. Move the zones that should receive the parameters of the selected zone to the right-hand list.

After pressing the "Save" button the NSM writes the setpoint parameters to all units in the destination zones.



11.4 - Rename a zone (screen D-3)

In screen D select the zone to be renamed and press/click button

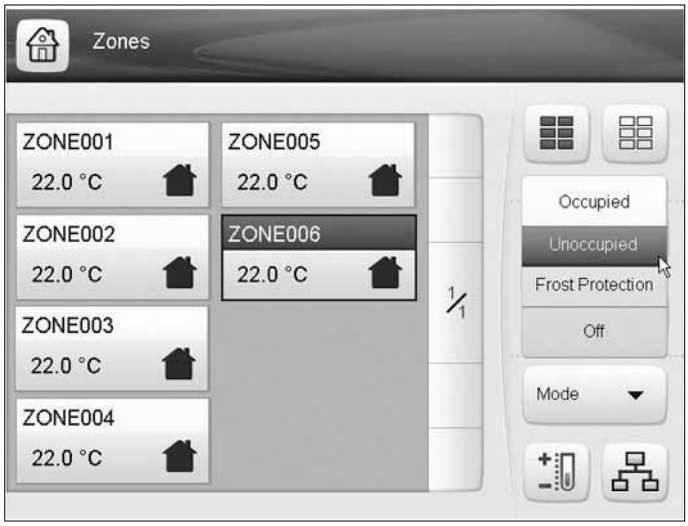


Enter the new name (12 characters maximum) and save.

NOTE: The names of the zones are listed in alphabetical order. The new order is only effective after a restart of the NSM (see section 8.3).

11.5 - Change the operating mode of a zone

In screen D select the zone(s) that require(s) a new occupancy period.



Press/click the "Mode" button and select the new occupancy period to be applied in the scroll-down list:

- Occupied: The terminal units of the zone(s) are changed to occupied mode. The AHUs of the zone(s) are switched to occupied mode. The dry contacts of the digital outputs of the zone(s) are closed.
- Unoccupied/Economy: The terminal units of the zone(s) are changed to unoccupied mode. The AHUs of the zone(s) are switched to unoccupied mode. The dry contacts of the digital outputs of the zone(s) are open.
- Frost protection: The units of the zone(s) are forced to the frost protection mode. The AHUs of the zone(s) are switched to unoccupied mode. The dry contacts of the digital outputs of the zone(s) are open.
- Shut-down: The units of the zone(s) are forced to the shut-down mode. The AHUs of the zone(s) are switched to unoccupied mode. The dry contacts of the digital outputs of the zone(s) are open.

NOTE: The shut-down and frost protection modes lead to an override of the terminal unit controller in these modes. This override cannot be cancelled by a command from the user interface or by a time schedule.

However the zone occupied or unoccupied commands can then be modified by a command from the user interface or a time schedule.

11.6 - Modification of a zone temperature setpoint (screen D-6)

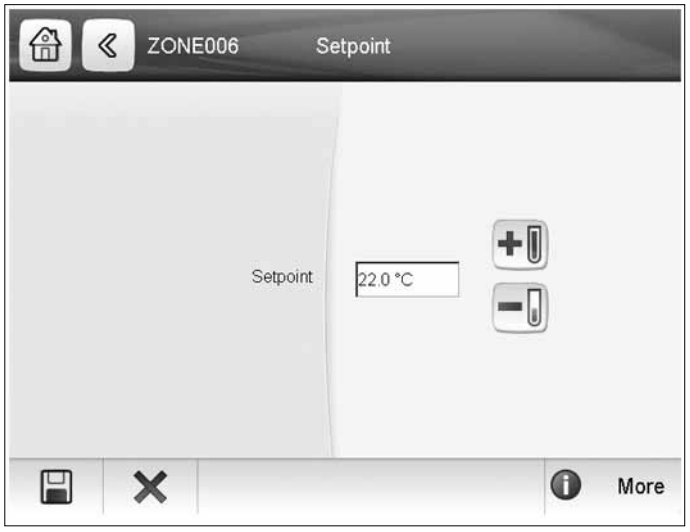
This screen is available if the zone includes one or several terminal units.

This function is used if all units in the zone are required to control the room temperature from the same central setpoint (except user reset).

- Limit values: 15 to 32°C
- Default value: 22°C

NOTE: The end user can reset this setpoint within certain limits via his control box in order to enhance his comfort.

To modify the setpoint:
In screen D select the zone concerned and click on button

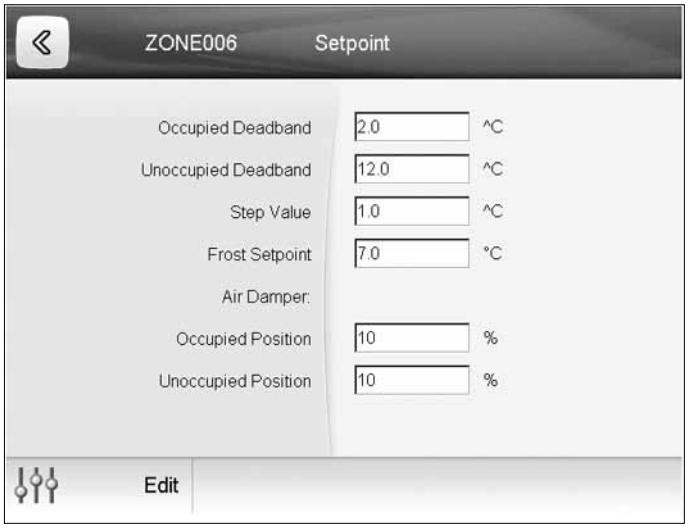


Modify the setpoint using buttons and

Save the modification to modify the setpoints of all controllers in the zone.

NOTE: The setpoint is only broadcast to the terminal units after it has been saved.

It is possible to access additional setpoint parameters by clicking the button
Advanced mode required.



Save the modifications to modify these parameters in all controllers in the zone.

NOTE: These parameters are only broadcast to the terminal units after they have been saved.

Definition of the setpoint parameters
Deadband in occupied mode "Occupied Deadband" and unoccupied mode "Unoccupied Deadband".

The deadband is a temperature range with the setpoint as its centre. The centre can be reset by the user in occupied mode.

If the room temperature is inside the deadband, the controller is in the satisfied mode. If the room temperature is outside the deadband, the controller modifies its operating mode to the heating mode or cooling mode to reach the temperature that is closest to the setpoint.

A small parameter value setting for the deadband will lead to more frequent cycling of the terminal unit actuators.

- Limit values (unoccupied): 5 K to 14 K
- Limit values (occupied): 1 to 5 K
- Default value (unoccupied): 12 K
- Default value (occupied): 2 K

Setpoint reset "Step Value"
This value allows the end user to adjust the setpoint to the value that corresponds to his comfort setting. Depending on the user interface the user reset above or below the setpoint is displayed by a changed position on the bar graph or rotation of the thumb wheel.

This reset is multiplied by the value of the reset step and then added to the central setpoint.

- Limit values: 0.5 K to 2 K
- Default value: 1 K

Example: The setpoint of the zone is fixed to 21°C. The reset resolution of the setpoint is fixed at 1°C.

The operator has pressed the + key on his user interface three times. The controller will control the ambient temperature around the central setpoint (21°C) + 3 x 1°C = 24°C.

NOTE: The NTC controller does not take the setpoint reset into consideration in the unoccupied mode.

Zone setpoint in the frost protection mode "Frost Setpoint"
If the room temperature is below this value, the terminal unit will operate in heating mode. Above this value the controller will not take any action.
Limit values: -20°C/14°C

Fresh air damper position in occupied and unoccupied mode "Air Damper Occupied/Unoccupied Position"
This control function is only available for units equipped with a motorised fresh air damper. These values define the fresh air intake in the occupied and unoccupied mode. They must be adjusted in relation to the maximum system air flow (100%).

11.7 - Find/modify the members in a zone (screen D-7)

In screen D select the zone and press/click button

The member units of the zone are displayed in the right-hand column.

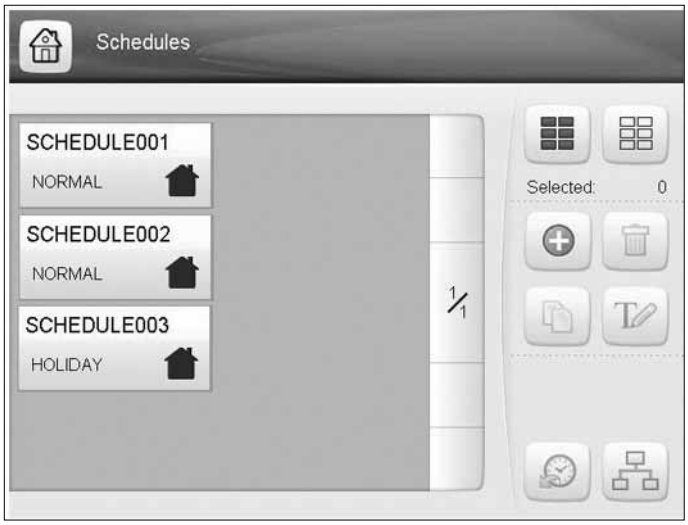
Save the modifications.

NOTE: Saving does not take place while writing the terminal units with the zone parameters and setpoints.

If the zone is a member of a time schedule the schedule command will be applied to the new member(s) at the next time schedule event.

12 - TIME SCHEDULE MANAGEMENT (SCREEN E)

In the welcome screen press/click the "Schedules" button to move to screen E.



The time schedules are displayed by page showing 8 pages and listed in alphabetical order.

In the right-hand band the page number is displayed together with the total number of pages. If the page number is higher than one, the up/down buttons are displayed. They allow the display of the previous or next page.

Pressing button "x2" allows the display of the page following the next or previous page.

For each schedule its type (normal, holidays) and the occupancy period are displayed. A maximum of 32 time schedules can be created.

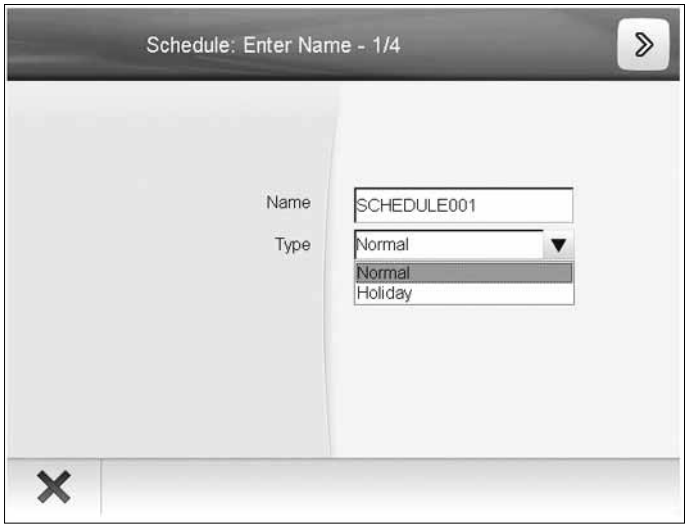
To select/deselect a "Time schedule" on the page, press/click its name. If a schedule is selected, the right-hand buttons are operational. If the buttons are greyed out, they are not operational.

For the explanation of all buttons refer to sheet 1 at the beginning of the document.

12.1 - Add a time schedule (Screen E-1)

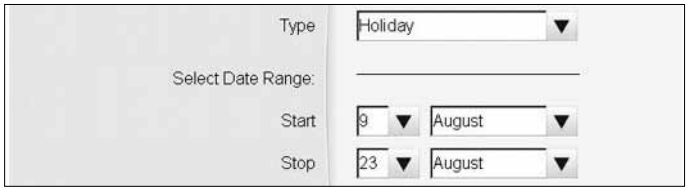
Advanced mode required.

In screen E do not select any time schedule and press/click button



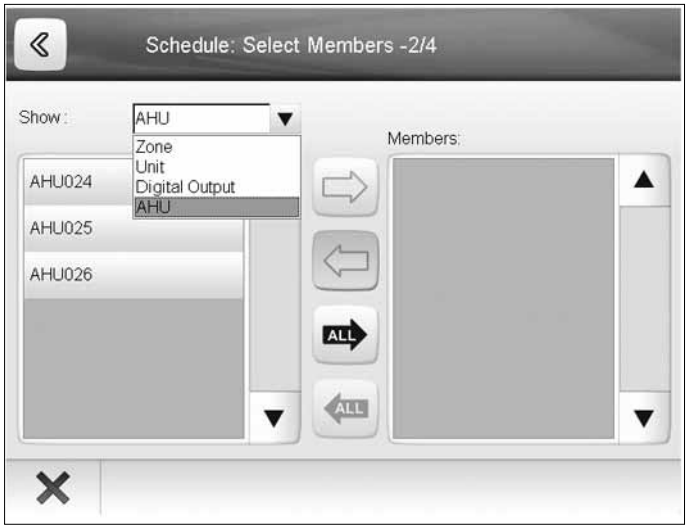
Enter the name and the type of the time schedule to be created from two available types:

- Normal: "Normal" (Time schedule active from January 1st to December 31st).
- Holiday: "Holiday" (Time schedule active during the selected period).



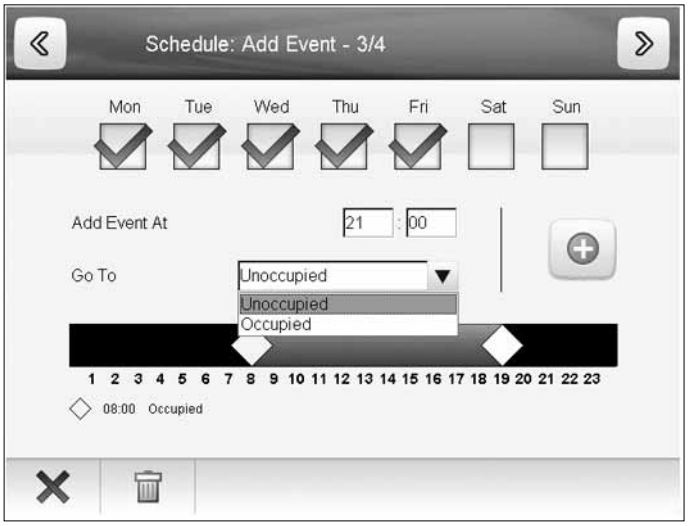
Please note that the time schedule "Holiday" has priority over a time schedule of the "Normal" type.

Then press/click the "Next" button to move to the second step.

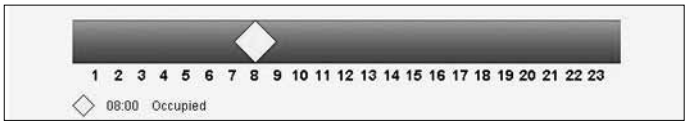


Select the zones and/or units and/or digital outputs and/or CCN air handling units that will be controlled by the time schedule in the left-hand list and move them to the time schedule members list (list on the right).

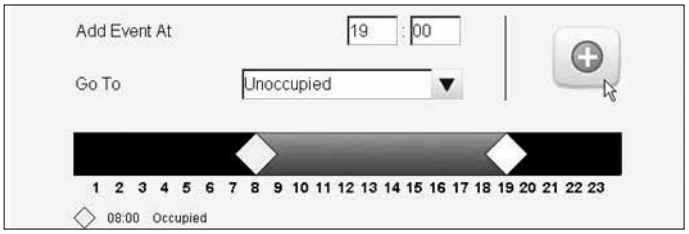
Press/click "Next" to move to the third step (screen E-6).



- Select the day(s) when the time schedule applies.
- Enter the time when the change from occupied or unoccupied mode is required (this time will be called time schedule event in the text that follows).
- Select the occupancy period to be transmitted (occupied or unoccupied).
- Press the "Add" button. A diamond-shaped symbol that corresponds to the selection made is placed on the time bar of the time schedule.



- Repeat the operation from point 2 for example to add the time when the change to an unoccupied command is required and press the "Add" button.



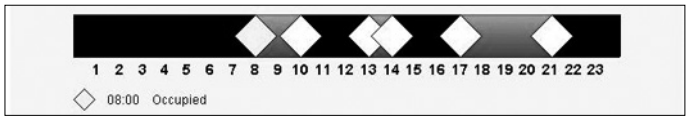
NOTE: The occupied period is shown in green colour. The unoccupied period is shown in black.

To select or display the details of a time schedule event press/click on the corresponding symbol. The exact time of the event is now shown as well as the occupancy command associated with it.

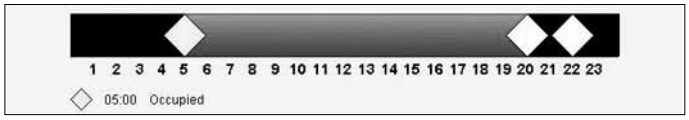
To delete a time schedule event, simply select it and then press the "Delete" button. Please note that the "Delete" button for a time schedule event is only shown, when an event has been selected.

NOTES:

- ***A maximum of six events can be inserted using the time schedule grid, this corresponds to three "Occupied" schedules with unoccupied periods in between.***



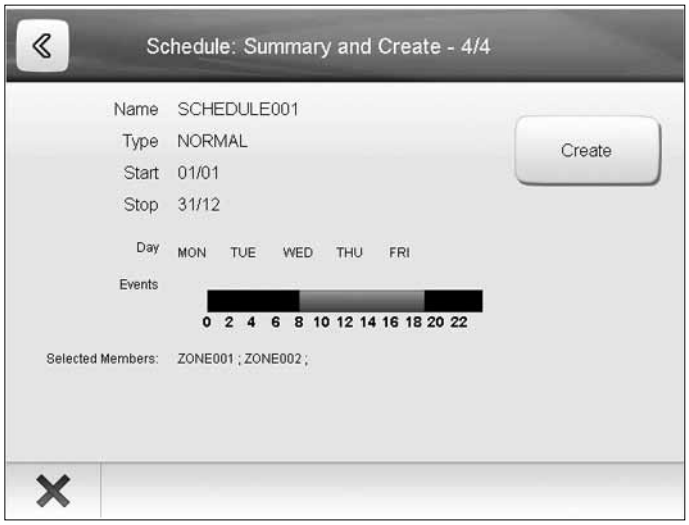
- ***Two time schedule "Occupied" or "Unoccupied" events can succeed each other to ensure that all the equipment is in the unoccupied mode during the night.***



- ***In the example above the "Unoccupied" mode sent at 19.00 p.m. by the last event on Friday will apply until the first event ("Occupied") on Monday at 8.00 a.m.***

Once the time schedule ranges have been established, move to the next step by pressing/clicking the "Next" button.

Verify the time schedule to be created and press/click the "Create" button to add this time schedule to the database.

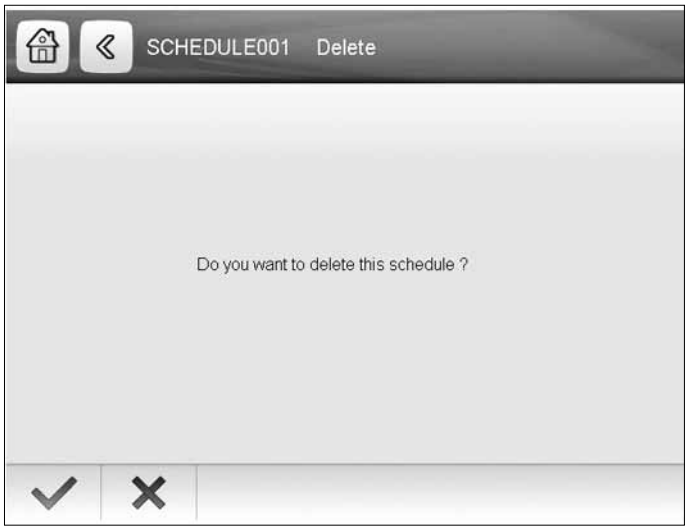

Schedule: Summary and Create - 4/4
Name SCHEDULE001
Type NORMAL
Start 01/01
Stop 31/12
Create
Day MON TUE WED THU FRI
Events
0 2 4 6 8 10 12 14 16 18 20 22
Selected Members: ZONE001 ; ZONE002 ;

The time schedule created is now in the list of existing time schedules.

12.2 - Delete a time schedule

Advanced mode required.

In screen E select the time schedule to be deleted and press/click button



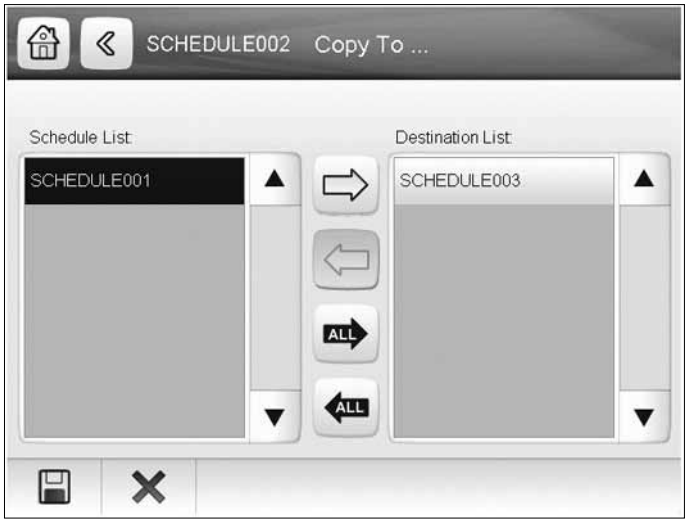
A message requests confirmation of the deletion. Press/click the "Yes" button to delete the time schedule.

12.3 - Copy the parameters of a time schedule to another time schedule (screen E-4)

Advanced mode required.

This function permits copying the time schedule events of a time schedule range of a selected schedule to one or more existing time schedule(s). This function does not copy the occupancy mode nor the members of the time schedule.

In screen E select the time schedule that includes the parameters to be copied and press/click button



The name of the time schedule to be copied is shown in the top band. Move the time schedules that should receive the parameters of the selected schedule to the right-hand list.

12.4 - Rename or modify a time schedule type (screen E-3)

In screen E select the time schedule type to be renamed or modified and press/click button

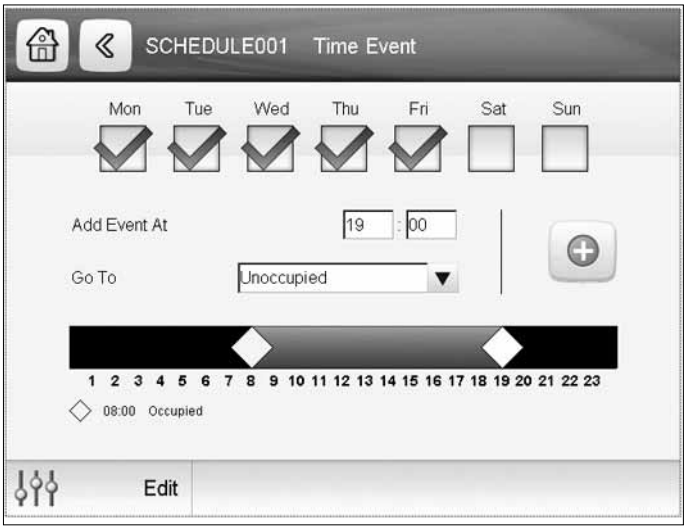
Enter the new name (12 characters maximum) and save or modify the time schedule type (see section 12.1) and save.

NOTE: The name of the time schedules is listed in alphabetical order. This list will only become effective after the NSM has been restarted (see section 8.3).

12.5 - Find/modify the events of a time schedule (screen E-6)

In screen E select the time schedule concerned and click button

This screen allows modification of the days and the time schedule events (see section 12.1).



See step 3 in section 12.1 to modify an existing time schedule.

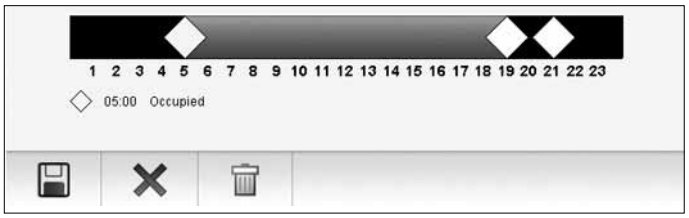
12.5.1 - Add an event to a time schedule

See step 3 in section 12.1 to modify an existing time schedule.

12.5.2 - Delete an event from a time schedule

See step 3 in section 12.1 to modify an existing time schedule.

The "Delete" button for a time schedule event is only shown, if an event is selected.



12.6 - Find and modify the members linked to a time schedule (screen E-7)

Advanced mode required.

In screen E select the time schedule concerned and press/click button

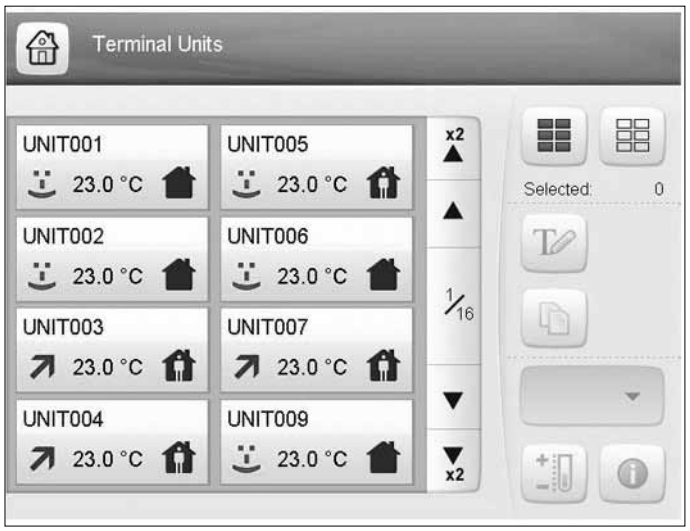
The members already linked to the time schedule are shown in the right-hand column.

Save the modifications.

NOTE: Saving does not take place by writing the terminal units and/or air handling units if an occupied period is currently effective. Writing will be done at the next time schedule event.

13 - MONITORING THE TERMINAL UNITS (SCREEN C)

In the welcome screen press/click the "Units" button to go to screen E.



The units are displayed by page showing 8 pages and listed in alphabetical order. In the right-hand band the page number is displayed together with the total number of pages. If the page number is higher than one, the up/down buttons are displayed. They allow the display of the previous or next page. Pressing button "x2" allows the display of the page following the next or previous page.

For each unit the setpoint, the operating mode and the occupancy period are displayed. A maximum of 128 units can be displayed. To select/deselect a unit on the page, press/click on its name. If a unit is selected the right-hand buttons are operational. If the buttons are greyed out, they are not operational.

For the explanation of all buttons refer to sheet 1 at the beginning of the document.

13.1 - Rename a unit (screen C-1)

In screen C select the unit to be renamed and press/click button

Press/click the "Edit" button and enter the new name (12 characters maximum) and save.

The navigation keys in the lower band allow display and possible renaming of the following or preceding unit.

NOTE: The name of the units is listed in alphabetical order. This order will only become effective after the NSM has been restarted (see section 8.3).

13.2 - Copy the parameters of a unit (screen C-2)

Advanced mode required.

This function allows copying all configuration parameters of a unit to one or more existing units. This function does not copy the occupancy mode.

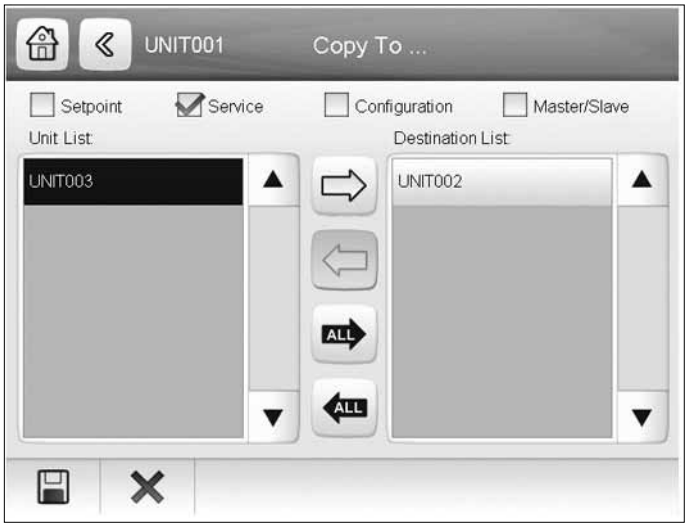
NOTE: The tick boxes "Service", "Configuration" and "Master/Slave" are masked in the guest mode.

In screen C select the unit to be copied and press/click button

The name of the unit to be copied is shown in the top band. Move the units that will receive the configuration of the selected unit to the right-hand list.

Then tick the configuration parameters of the NTC controller that need to be copied.

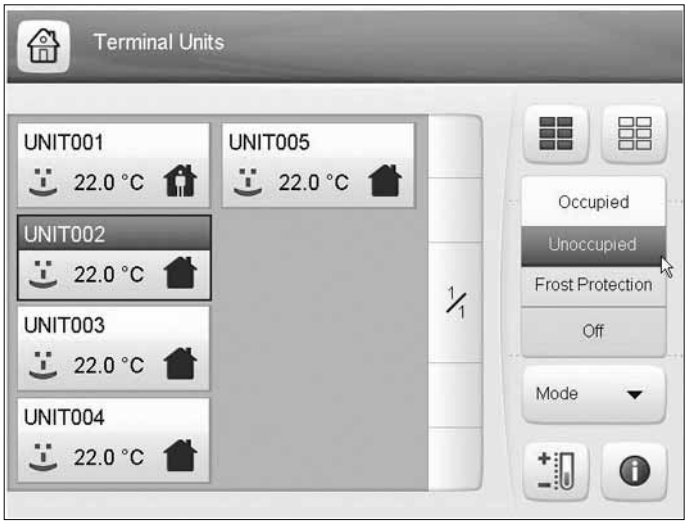
- "Setpoint" to copy the CCN TCSTP table that contains the setpoint parameters,
- "Service" to copy tables CCN FACTORY1 and FACTORY2 that contain the parameters for the terminal unit,
- "Configuration" to copy the CCN TCCONFIG and TCUI tables that contain the parameters for the installation,
- "Master/Slave" to copy the CCN TCMS table that contains the master/slave parameters.



Finally press the "Save" button to write the configuration parameters to the destination unit(s).

13.3 - Change the occupancy mode of a unit (C-3)

In screen C select the unit or units for which the mode needs to be changed.



Press the "Mode" button to select the new mode to be applied (occupied, unoccupied, frost protection, off) in the scroll-down list.

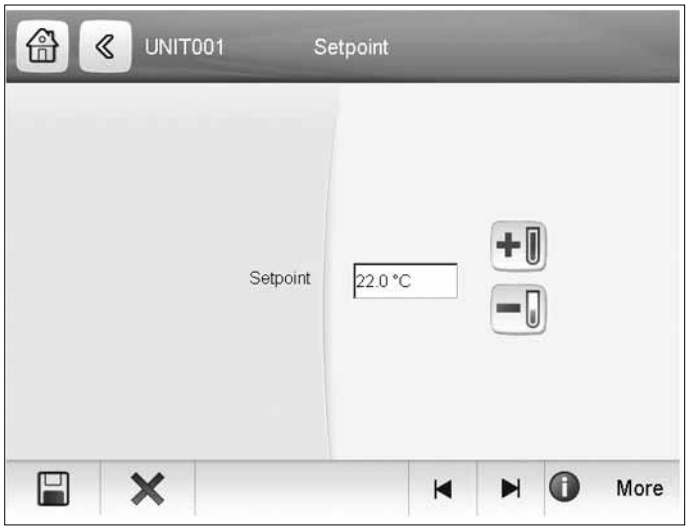
- Occupied: The terminal units selected are changed to occupied mode.
- Unoccupied/Economy: The terminal units selected are changed to unoccupied mode.
- Frost protection: The units selected are forced to the frost protection mode.
- Off: The units selected are forced to the shut-down mode.

NOTE: The shut-down and frost protection periods lead to an override of the terminal unit controller in these modes. This override cannot be cancelled by a command from the user interface or a time schedule.

However the unit occupied or unoccupied commands can then be modified by a command from the user interface or a time schedule.

13.4 - Modify a unit setpoint (screen C-4)

In screen C select the unit concerned and click button



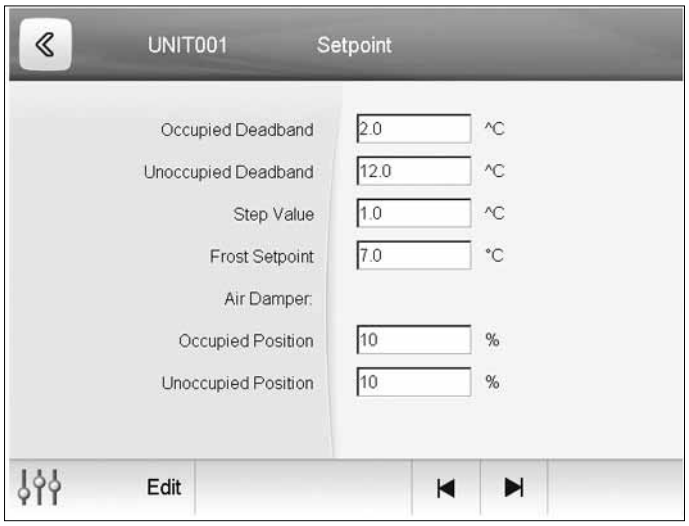
Modify the setpoint using buttons and

Save the modification with the "Save" button.

NOTE: The setpoint is only transmitted to the terminal unit after saving. There is no regular setpoint transmission. Saving does not take place when a "writing in progress" screen appears.

The navigation keys in the lower band allow display and possible modification of the setpoint of the following or preceding unit.

NOTE: It is possible to access the additional setpoint parameters by clicking the button

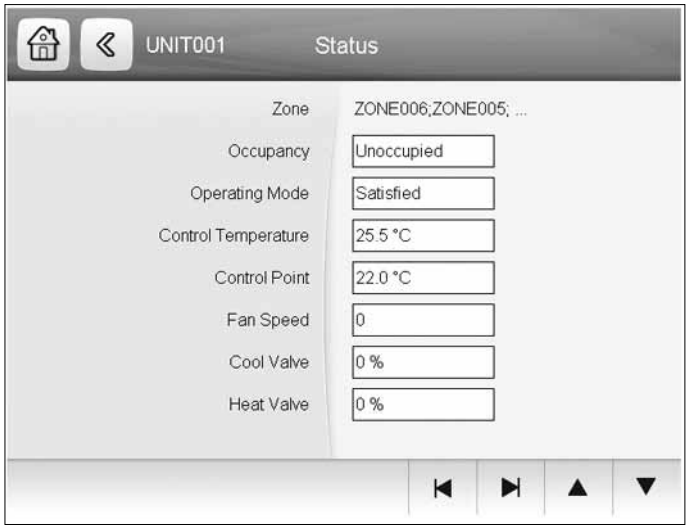


For the description of each parameter refer to section 11.6.

NOTE: Saving does not take place when a "writing in progress" screen appears.

13.5 - Find the status of a unit (screen C-5)

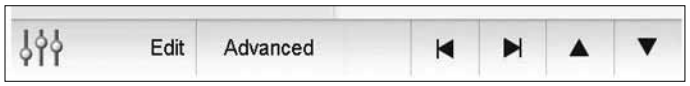
In screen C select the unit for which information is required and click the button



The buttons

allow display of the parameters of the following or preceding unit.

NOTE: The "Edit" and "Advanced" buttons allow unit configuration. They are only available in Advanced mode.



Explanation of the parameters displayed in this screen

Zone
"Zone": A unit can belong to one or several zones. If the field is empty, the unit does not belong to any zone.

Occupancy
"Occupancy": Occupancy status of the unit.

Operating mode
"Operating mode": Operating mode of the controller. It is determined from the occupancy mode, from the setpoint compared to the current conditions (room and water temperature).

- Satisfied

  The room temperature is inside the deadband.

- Cooling demand

  The room temperature is outside the deadband and higher than the setpoint.

- Heating demand

  The room temperature is outside the deadband and lower than the setpoint.

Controlled temperature
"Control Temp": this is the room or return air temperature that is possibly corrected in accordance with the units.

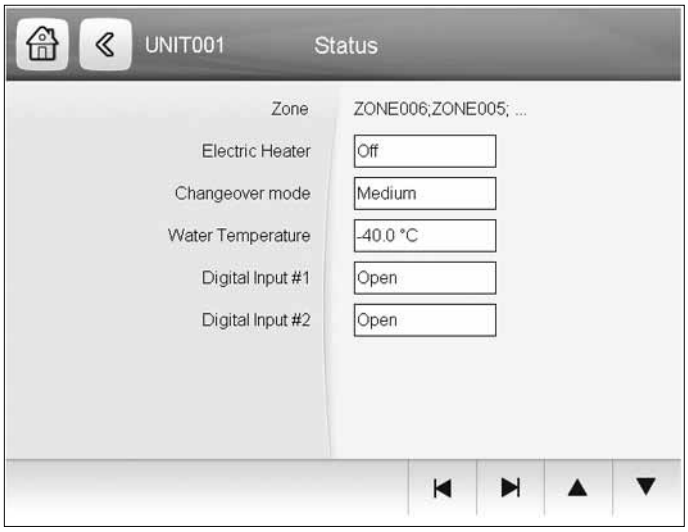
Control point
"Control Point": this is the setpoint used by the control. Its value includes a possible reset requested by the user interface.

Fan speed
"Fan Speed": this variable shows the ventilation status expressed in % for a fan motor with variable speed (0-100) or for a three-speed fan motor (0 = off, 1 = low speed, 2 = medium speed, 3 = high speed)

Cold water valve status
"Cool Valve":
- closed (0%)
- fully open (100%)

The buttons

allow the display of other unit parameters (see the screen below).



Explanation of the parameters shown on this screen

Hot-water valve status
"Heat Valve":
- closed (0%)
- fully open (100%)

Electric heater status
"Electric Heater":
- on
- off

Changeover mode
"Changeover Mode": this function is used with reversible heat pumps. This is (these are) the controller operating mode(s) possible in relation to the water temperature.
- "None": the "changeover" function is not configured.
- "Cool": operation in cooling mode authorised.
- "Heat": operation in heating mode authorised.
- "Medium": water temperature outside the range for authorised operation in heating mode or cooling mode.
- "Cool & Heat": operation in heating mode and/or cooling mode authorised.

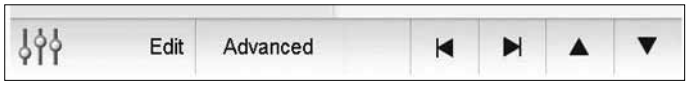
Water temperature
"Water Temperature": this is the water temperature seen by the controller.

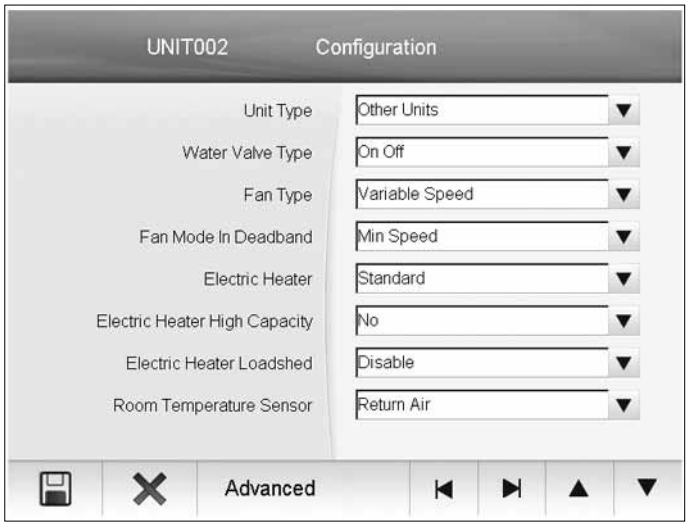
Digital inputs
"Digital Input": this is the status (open/closed) of the two digital inputs.

13.6 - Find/modify the basic unit parameters

Advanced mode required.

In screen C-5 (see above) press/click the "Edit" button.





Unit type
"Unit Type": configured at the factory. It is recommended not to change the configuration defined except if the controller is replaced.

Possible types:
- Cassette unit (42GW) (default),
- Console unit (42N vertical),
- Ceiling unit (42DW, 42EM, 42N horizontal 42BJ),
- Other units.

Water valve type
"Water Valve Type": configured at the factory. The water valve(s) can be the following type:
- 230 V (on/off), default,
- Proportional 3 points 230 V (0-100%).

The hot-water and the cold-water valves must be of the same type.

Fan type
"Fan Type": the fan motor can be of the following type:
- variable speed,
- three speeds,
- variable speed with electronic changeover.

Fan mode in the deadband
"Fan mode In Deadband": In occupied mode this configuration permits selecting the fan mode in automatic mode and inside the deadband:
- the fan has stopped,
- the fan maintains a minimum fan speed (default).

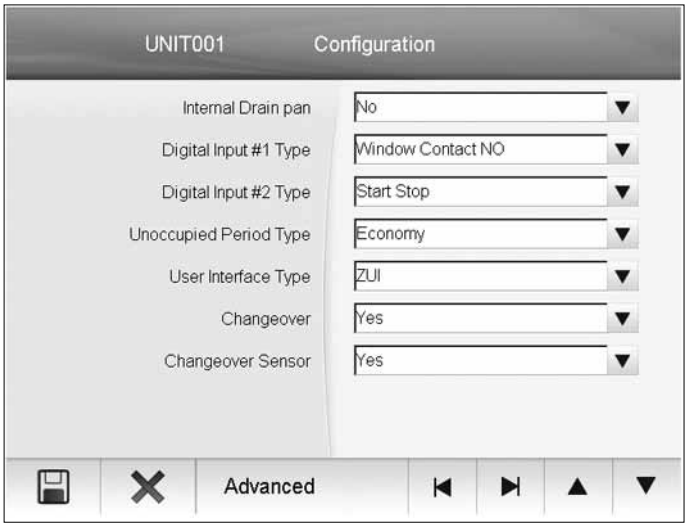
Electric heater
"Electric Heater": configured at the factory.
- None: no electric heater (default),
- Standard: shielded heater (for example),
- PTC: Electric heater with positive temperature coefficient.

High-capacity electric heater
"Electric Heater High Power": high-capacity, configured at the factory
- Yes
- No

Electric heater loadshed
"Electric Heater Loadshed": This parameter allows activation or deactivation of the electric heater loadshed function. The default is that the loadshed function is deactivated.

The buttons and

allow the display of other unit parameters (see the screen below).



Room temperature sensor
"Room Temperature" Sensor: The temperature sensor can be:
- a room temperature sensor generally located on the wall of the room to be air conditioned,
- a temperature sensor located in the terminal unit return air (default),
- a room temperature sensor integrated into the user interface (ZUI 2, CRC2 or SUI).

Condensate pan
"Internal DrainPan": inside the unit, equipped with a lift pump (42GW).
Configured at the factory:
- Yes
- No

Digital inputs
"Digital Input#" 1 and 2: two digital inputs (DI, dry contact) depending on their configuration they permit:
- to determine the status of a window contact,
- to arrange filling the condensate pan (except 42GW),
- to control the start/stop mode,
- to unload the electric heater,
- to detect the presence of an occupant in the office,
- to only restore the status of the connected contact,
- to detect an abnormal CO_2 level.

Certain configurations also permit defining the status when the dry contact linked to the input is deenergised (normally open or normally closed).

All these configurations permit activation of internal controller functions. For more detail refer to the controller documentation.

Operating type in an unoccupied period
"Unoccupied Period Type": the unoccupied mode can be:
- an economical mode with a wider deadband than the occupied mode (recommended),
- a frost protection mode that no longer ensures the air conditioning of the room and authorises heating if the temperature is below the frost protection setpoint,
- a stop mode.

User interface type
"User Interface Type": The controller is connected to:
- None: no user interface connected,
- IR2: infrared remote control,
- ZUI2: communicating wired remote control,
- CRC2: communicating wired remote control,
- SUI: analogue and non-communicating wired remote control.

Activation of the changeover function
"Changeover": Activation of the "Changeover" function is useful in two-pipe systems, if cold or hot water needs to be transported, depending on the season.

In a four-pipe system the controller uses this function in the heating mode to ensure that there is hot water in the system before controlling.

Possible values:
- No: changeover function deactivated,
- Yes: changeover function activated.

Water temperature sensor
"Changeover sensor": This permits the controller to find the water temperature in the circuit to determine the possible operating mode(s): heating and/or cooling.

Possible values:
- No: no water temperature sensor present (default). If the "changeover" function is activated, the water temperature must be supplied by another device. For example by activating transmission of the chiller/heat pump leaving water temperature (see section 10.1.3) or by configuring the NTC zoning function (see technical documentation for this controller).
- Yes: a water temperature sensor is connected to the controller.

NOTE: A temperature value from the CCN network has a higher priority to the one issued by the temperature sensor.

13.7 - Terminal unit operating history

To access the trending curves, select a terminal unit and press/click on the button in screen C-6.

The screen below is now displayed with the list of pre-defined points for the terminal units. The trending curves to be displayed can be selected:

Refer to chapter 10.2.3, as the configuration for displaying the trending curves for the terminal units follows the same description.

NOTE: On the display screen for the trending curves the buttons

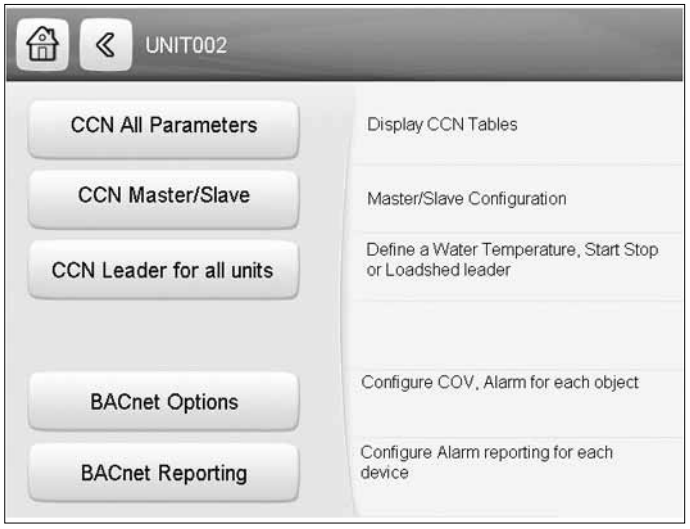
will display the curves for the previous or next unit.

13.8 - Access to the advanced unit parameters (screen C-5-2-1)

Advanced mode and Service mode required for access to the CCN tables.

In screen C select the desired unit and click on button

To access the advanced unit information press/click the "Advanced" button.



The screen below (screen C-5-2-1) gives access to:

- the unit status and configuration from the CCN tables,
- the status and configuration of the master/slave relationship between terminal units,
- the status and configuration of the zoning relationship between terminal units.
- the BACnet options configuration.
- the BACnet alarm configuration.

13.8.1 - Configuration of the BACnet interface for terminal units

Advanced mode required.

It is recommended to refer to chapter 16 for more information about the BACnet IP interface supported by the Aquasmart system.

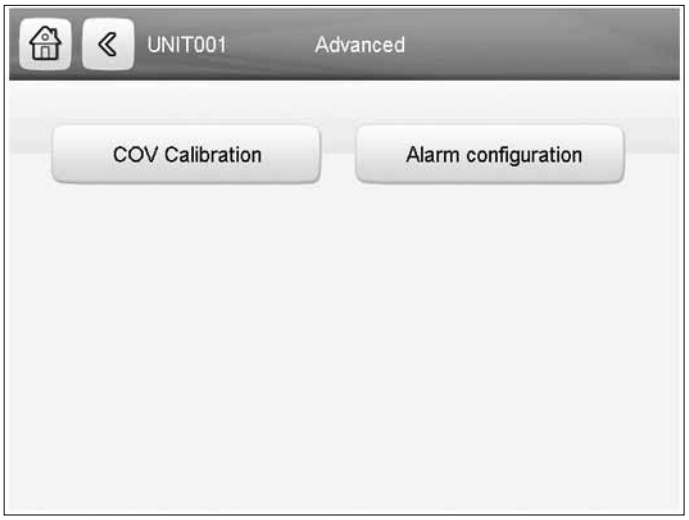
In screen C5-2, press/click the "Advanced" button to get to screen C-5-2-1 below.

The "BACnet Options" button gives access to the "COV" option configuration and the "Intrinsic Reporting" alarm option.

The "BACnet Reporting" button allows specification of the equipment to be notified if an alarm is detected or there is a status change.

13.8.1.1 - Configuration of the COV values

In screen C-5-2-1 press/click the "BACnet Options" options button.

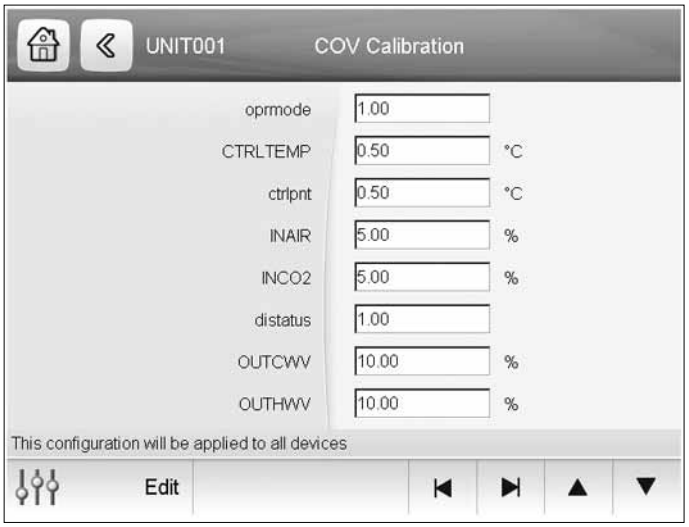


Press/click the "Alarm Configuration" button to display the configuration of the objects that support the "intrinsic reporting" option.

For the terminal units all all objects support this option, but only the COV of "Analogue value" object types can be configured from this screen:

The description of the BACnet objects is given in chapter 16.3.2.

The values below are the default values that can be modified. They apply to all terminal units.



Pressing/clicking the "Edit" authorises the configuration modification.

IMPORTANT:

- ***Saving the COV configuration will only be effective if it is done from the NSM screens.***
- ***The equipment that is to be notified if a variation of these values exceeds the configured values must periodically be linked to the associated BACnet service, as this information will be lost in case of a power cut or restart of the unit.***

13.8.1.2 - Configuration of the alarms (Intrinsic reporting)

Press/click the "Alarm Configuration" button to display the configuration of the objects that support the "intrinsic reporting" option.

For the terminal units four objects support this option:

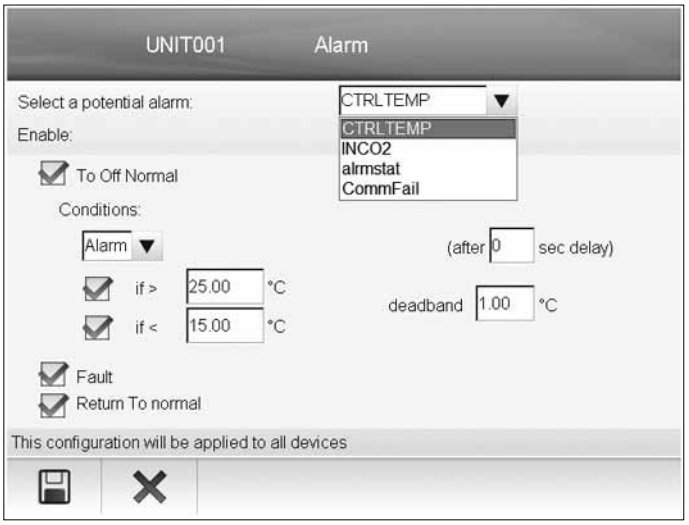
CTRLTEMP	Room or return air temperature possibly corrected according to the units.
INCO$_2$	For a unit equipped with a CO_2 sensor this is the value if the CO_2 concentration measured in the room. The value is expressed as a percentage of the maximum CO_2 concentration measurable by the sensor.
almstat	Alarms present at the controller.
Commfail	Communication status with the NSM (normal/fail)

The values below are the default values that can be modified. They apply to all terminal units.

For "Analogue Value" objects:

- A high and a low limit can be specified.
- A latent time before the alarm generation can be configured (in seconds).
- If the "To Off Normal" box is ticked, an alarm will be generated, if the temperature value in the example below is higher than 25°C or lower than 15°C.
- If the "Return To Normal" box is ticked, a notification is generated if the temperature returns to the configured limits.
- The "deadband" value is used to determine the return to normal of an alarm condition. For example, if the alarm has been generated, because the value was higher than the high limit, the "deadband" value will be subtracted from the high limit. If the current value is lower than this result and higher than the low limit, a notification "Return To Normal" can be generated.
- The "deadband" also applies, if the value is lower than the low limit.
- If the "Fault" box is ticked, an alarm will be generated, if the temperature value is outside the limit. This will for example be the case, if the temperature sensor is disconnected or not working.

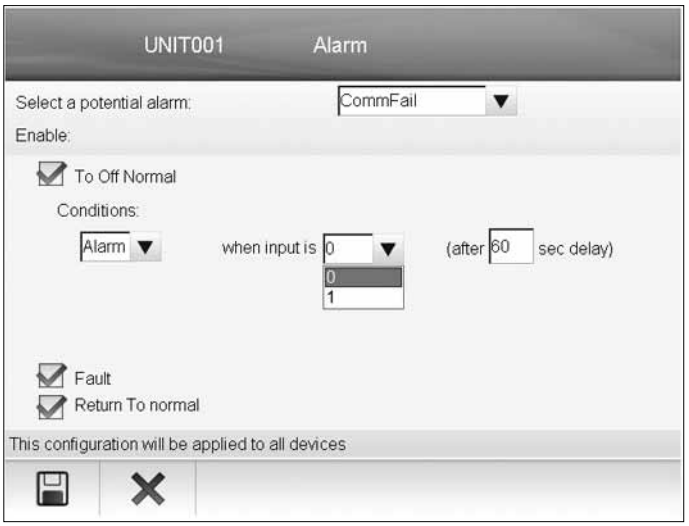
The configuration screen is as follows:



For "Binary Value" objects:

- A latent time before the alarm generation can be configured (in seconds).
- If the "To Off Normal" box is ticked, an alarm will be generated, if the "commfail" value in the example below is 1.
- If the "Return To Normal" box is ticked, a notification is generated, if this value returns to 0.
- If the "Fault" box is ticked, an alarm will be generated, if the value is outside the limit - that does not apply in this example.

The configuration screen is as follows:



Pressing/clicking the "Edit" authorises the configuration modification.

IMPORTANT: This configuration applies to all Aquasmart system equipment.

IMPORTANT: Saving the alarm notification configuration will only be effective if it is done from the NSM screens.

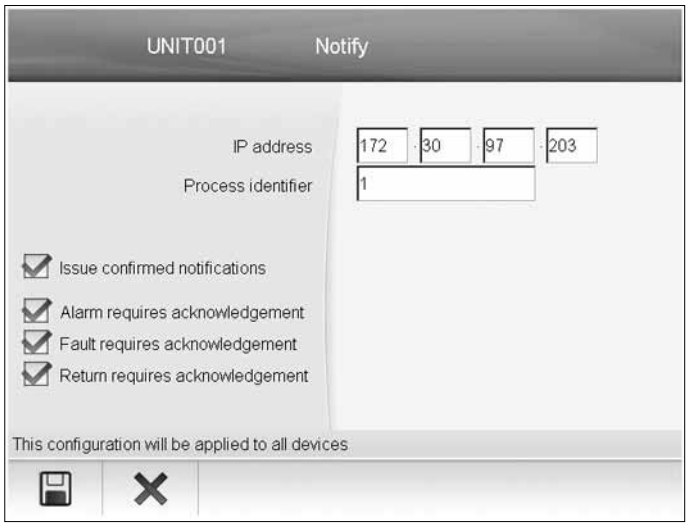
13.8.1.3 - Configuration of the alarm notification

In this screen press/click the "BACnet reporting" button.

Pressing/clicking the "Edit" authorises the configuration modification.

The equipment that will receive the alarm notifications must be known by the system. This is usually the building management system.

Its IP address must be registered in the NSM as shown below.



The "Process Identifier" identifies a task of the addressed equipment. This is responsible for the notification treatment of the alarms received.

If the "Issue Confirmed Notifications"box is activated, the NSM will send notifications to be confirmed by the addressed equipment. Sending alarm notifications does however not require confirmation.

If the "Alarm Requires Acknowledgement" box is activated, the NSM will send alarm notifications to be acknowledged by the addressed equipment (user acknowledgement). The same applies to "Fault Requires Acknowledgement"and "Return Requires Acknowledgement".

IMPORTANT: In order to simplify the interface an alarm notification can only be sent to one piece of equipment, daily and hourly. The addressed equipment will receive all transition types, i.e. TO-OFFNORMAL, TO-FAULT and TO-NORMAL. The priority level associated with these transactions is 128.

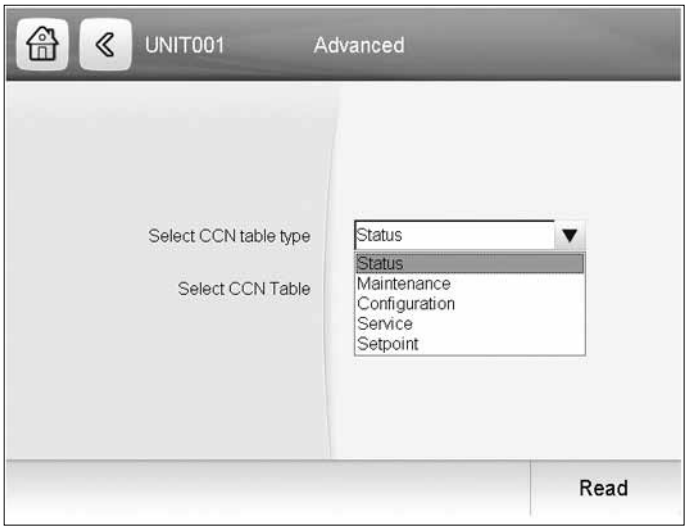
This configuration applies to all Aquasmart system equipment.

IMPORTANT: Saving the alarm notification configuration will only be effective if it is done from the NSM screens.

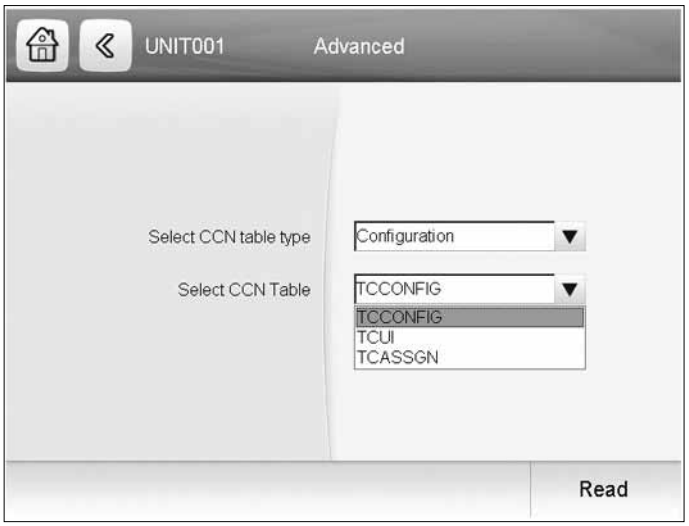
13.8.2 - Access to the unit CCN tables (screen C-5-2-1)
The Service mode is required.

In screen C-5-2-1 press/click the "All Parameters" button.

The CCN tables for a unit are available by type.



Once the table type has been chosen, select the CCN table to be displayed.



Press/click the "Read" button. In addition to the display the user can carry out configuration and override operations.

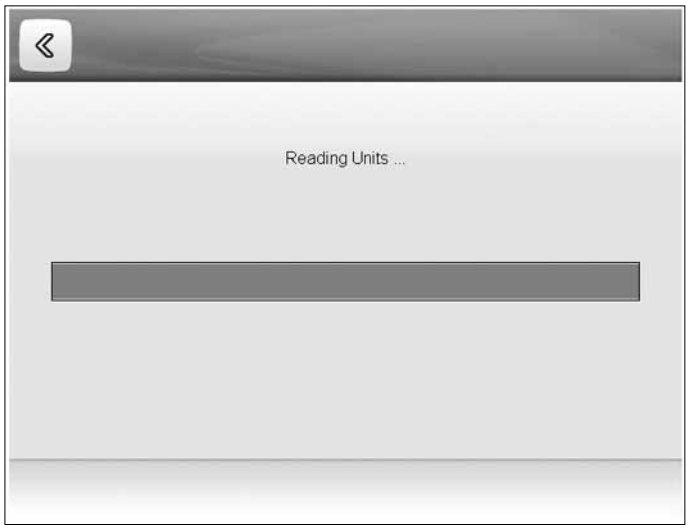
The background colour of a CCN point in the CCN "Status" tables is normally white. For a CCN point in alarm condition it is pink, and for a forced CCN point it is blue.

For more detailed information about the CCN tables refer to the user guide for the NTC controller of the terminal unit.

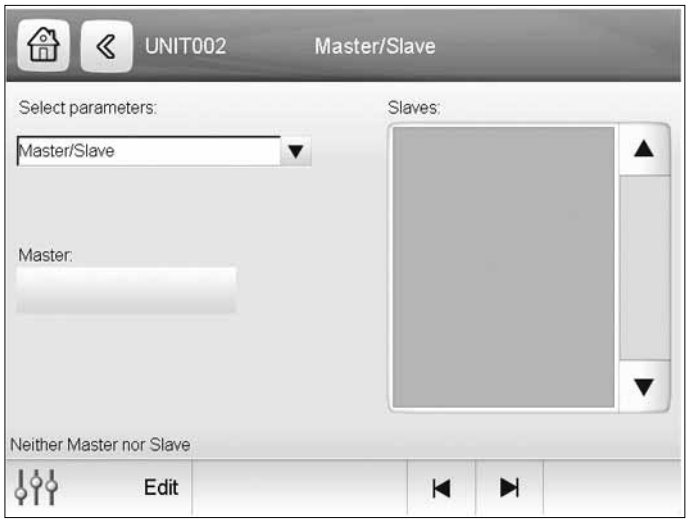
13.8.3 - Find and modify the master/slave relationship between units (screen C-5-2)
The Service mode is required.

In screen C-5-2-1 press/click the "Master/Slave" button.

The NSM reads all units to find all master/slave links and in particular those that are associated with the unit selected.



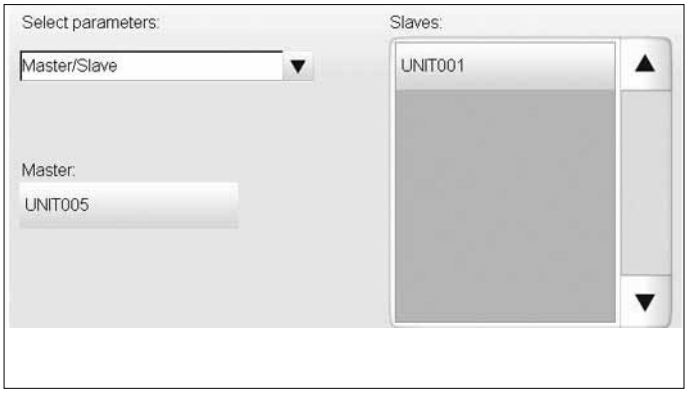
This screen gives the status of the master/slave relationship with other units. The name of the selected unit is displayed in the top band.



The buttons

allow the display of the master/slave relationships of the following or preceding unit. To modify the master/slave configurations press/click the "Edit" button.

In the following examples the selected unit "UNIT005" is neither master nor slave (above), then master of controller "UNIT001" (below), then slave of controller "UNIT001".



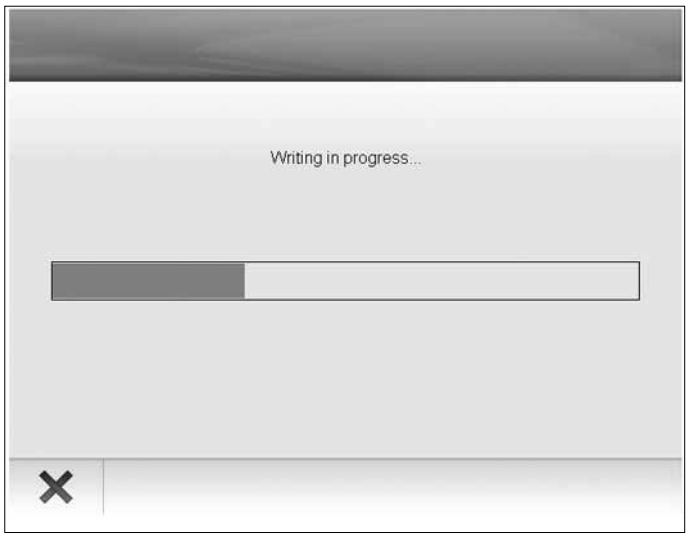
The left-hand list shows the units without master/slave relationship. Move the units from the left-hand list to the right-hand list so that they become slaves of the selected unit. Move the units from the right-hand list to the left-hand list so that they are no longer slaves of the selected unit. The name of the master unit is shown in the top band.

The scroll-down list also allows the display and definition of the controller responsible for the transmission of the control temperature, the CO_2 rate (optional) or the TVOC rate (optional) to the other controllers of the master/slave group.

NOTES:
If the controller software version is version 2.x the "Control Temperature" relationship must be clear and defined in the same way as the master/slave relationship.

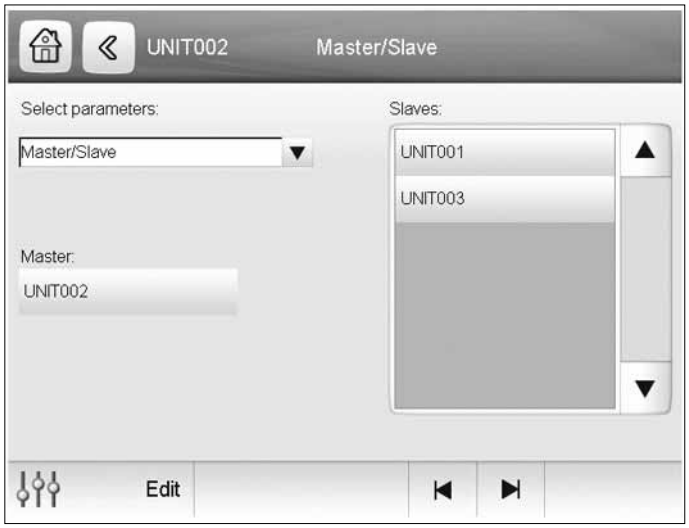
If the controller software version is version 3.x, by default and without configuration and with master/slave setting at the "Control Temperature" parameter, the master controller will transmit the control temperature to its slaves.

Save the modifications to write the controllers.

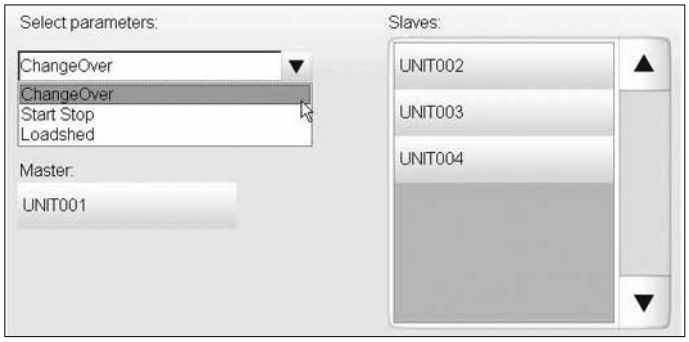


13.8.4 - Select a unit responsible for "Zoning" (screen C-5-3)
In screen C-5-2-1 press/click the "Leader For All Units" button.

The NSM will read all units to find the "Zoning" links and in particular those that are associated with the unit selected.



The scroll-down list allows display of the controller responsible for the broadcast:
- of the water temperature for the calculation of the "Changeover" mode,
- of an occupied mode/unoccupied mode command (Start/Stop),
- loadshed information (Loadshed).



For the display, navigation and configuration of the controller(s) responsible for broadcasting one of these informations and the configuration of the destination controllers refer to the previous section 13.8.3.

14 - ENERGY MANAGEMENT (SCREEN G)

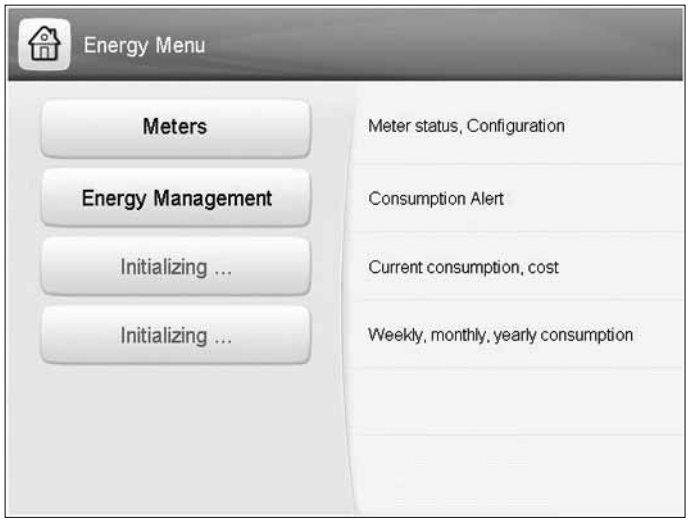
IMPORTANT: The information given on the consumption cost is for information only and must never be used for possible re-invoicing.

Advanced mode required.

The NSM includes three inputs for pulse metering, compatible with standard IEC 62053-031 on pulse outputs of energy meters.

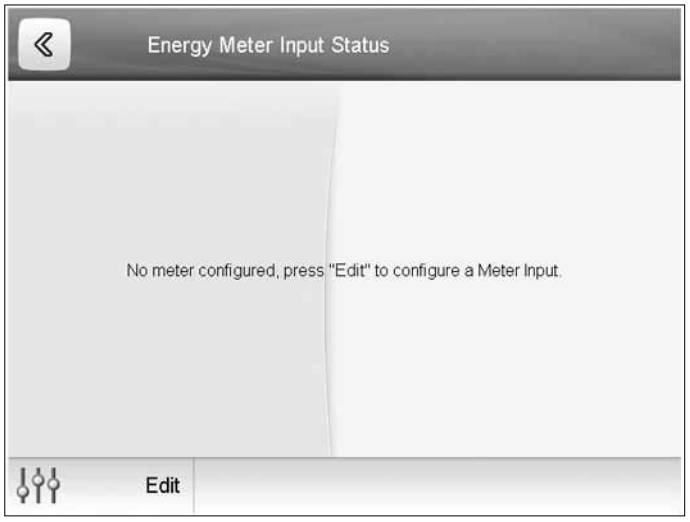
14.1 - Configuration of the energy meter inputs of the NSM

In the welcome screen press/click the ENERGY button and then the button "Meters".

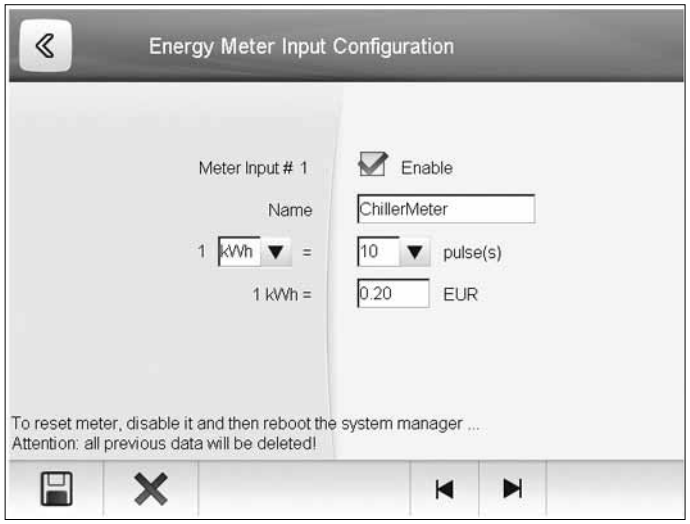


NOTE: During the initialisation of the energy management module or if no meter has been configured, the NSM does not allow access to the total energy consumption information nor to the history data.

Press/click the button "Meters" to configure the NSM meter input(s). If no meter has been configured, the following screen (screen G-1) is displayed.



Pressing the "Edit" button allows access to the meter input configuration screen (screen G-1-1).



- Tick the box to validate the meter input.
- Enter the meter name (maximum 12 characters).
- Select the unit as well as the pulse weight (see the energy meter characteristics).
- The cost (optional) per kWh or m^3 depending on the unit chosen.

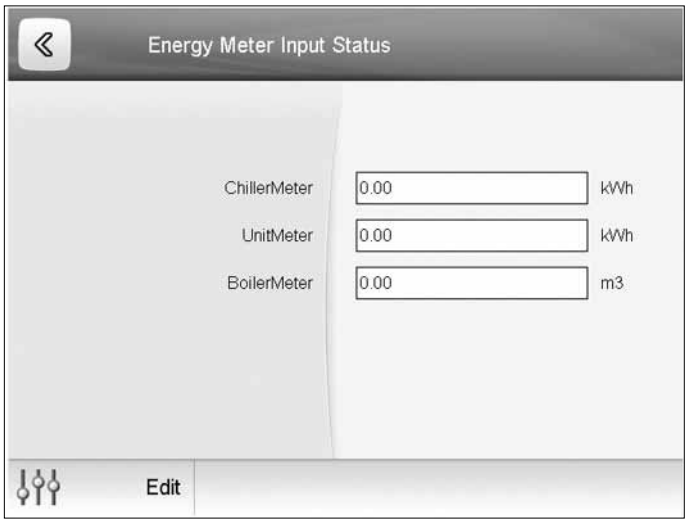
The buttons permit the display of the previous of next metering input configuration

NOTE: To reset an NSM meter to zero, the meter must be deselected and the NSM must be restarted. The data stored in the meter up to that time is deleted and the meter is reset to zero.

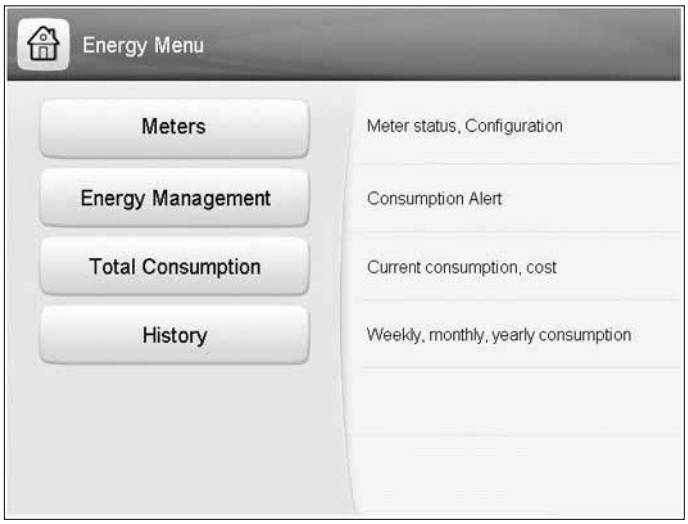
Once this information has been saved, returning to the previous screen (screen G-1) will permit displaying the NSM meter value.

14.2 - Displaying the energy meter values of the NSM

In the welcome screen press/click the button to access screen G, and then press the button "Meters" to display screen G-1.



Returning to the previous screen now allows access to the total energy consumption and the consumption history (screen G).

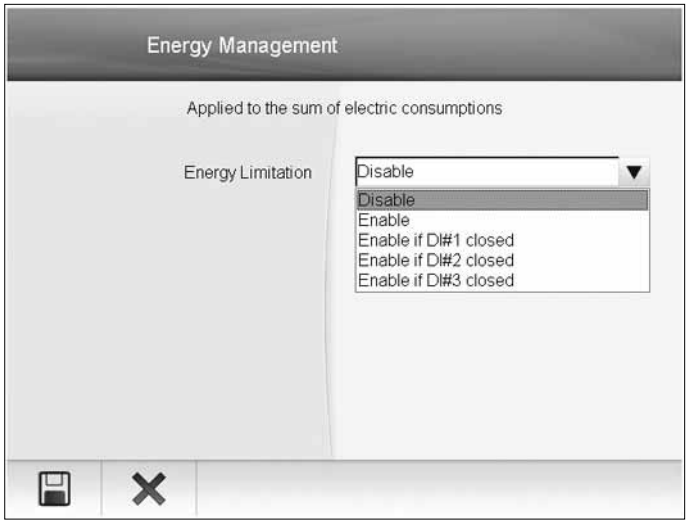


14.3 - Energy management

In screen G press/click the "Energy Management" button to access the energy management module (screen G-2).

This module can alert a relief equipment device or a building management system or simply an LED (supplied by very low voltage) if the total energy consumption (kWh) exceeds a configured threshold.

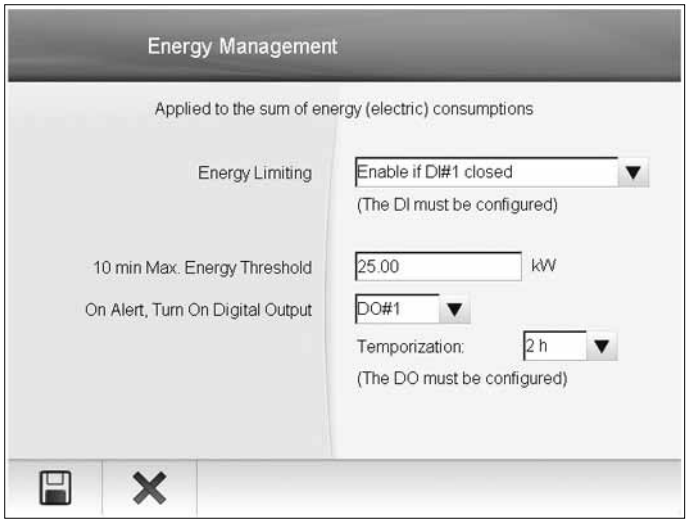
The screen below (screen G-2) shows how to activate it:
- permanently (Enable),
- depending on the status of a digital input.



Once the energy limiting module activation has been set up, the maximum energy threshold of 10 minutes in kWh must be configured.

Finally the output to be used to alert the building management system must also be configured.

NOTES:
- ***The maximum energy threshold is compared to the sum of the meter consumptions in kWh.***
- ***Do not forget to also configure the input and/or output used (see section 6.2.16). If this is not done, a message in blue appears below the configuration.***

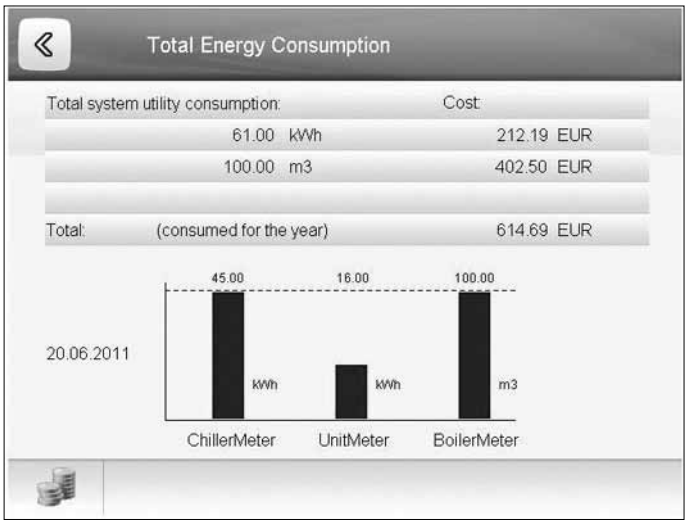


14.4 - Total consumption for the current year

In screen G press/click on the "Total Consumption" button to access the screen (screen G-3). This screen permits finding the total consumptions for the current year at time T.

It displays:
- the sum of the consumptions of the meters in kWh
- the sum of the consumptions of the meters in m^3.

For each consumption the NSM gives the corresponding cost and then the total sum.



The date is displayed at the bottom left of the screen in the "Day.Month.Year" format.

14.5 - Consumption history

In screen G press/click the "History" button to access the energy metering history (screen G-4).

The daily consumption is saved in a .csv file. A new file is created at the beginning of a new calendar year. The NSM keeps the consumption history for two years plus the current year.

The menu below gives access to the consumption history:
- Hour by hour for two days (daily consumption),
- Day by day for one week (weekly consumption),
- Day by day for one month (monthly consumption)
- Month by month for one year (yearly consumption)

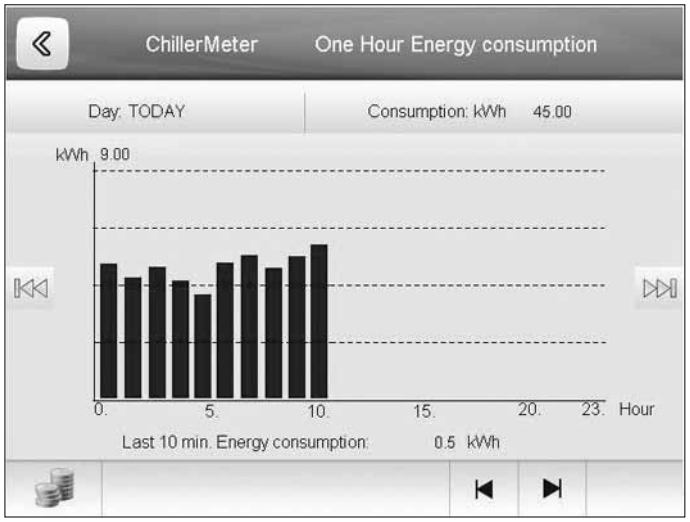
14.5.1 - Current consumption history

In screen G4 press/click the "Daily Consumption" button to access the current consumption history (screen G-4-1).

This screen displays the hour-by-hour consumption during the day and the monitoring parameter for a meter.

The day is displayed at the top left (today/yesterday). The cumulative consumption for the day is displayed at the top right.

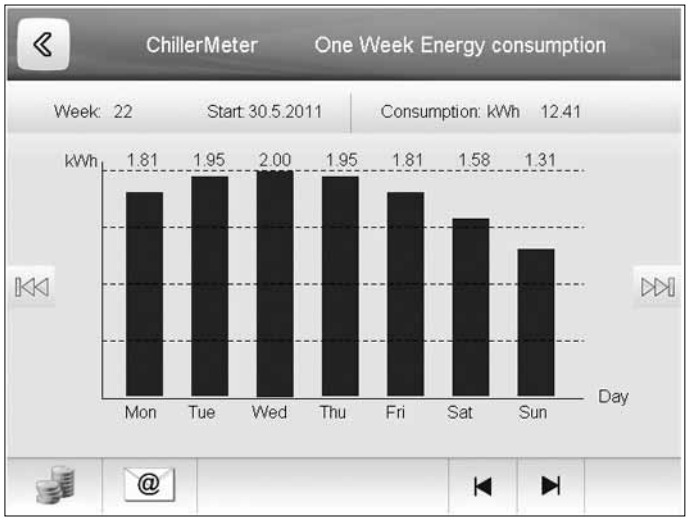
The 10-minute consumption is displayed below the histogram. It is refreshed every 10 seconds.



14.5.2 - Weekly consumption history

In screen G4 press/click the "Weekly Consumption" button to access the weekly consumption history (screen G-4-2). This screen displays the day-by-day share of the weekly consumption for a meter.

The number of the week is displayed at the top left, as well as the date at the beginning of the week. The cumulative consumption for the week is displayed at the top right. The consumption for each day is displayed above each bar of the histogram.

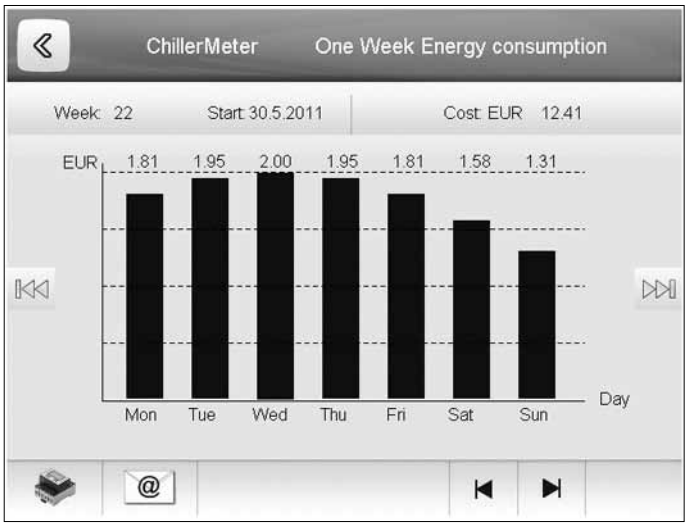


Buttons and permit displaying the history for the previous or next period.

Button permits sending an e-mail to the configured recipients. A .csv file containing the daily consumption since the beginning of the year is attached to the e-mail.

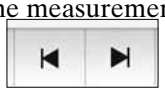
Button permits display of the consumption cost in the configured currency (see the screen below).

The screen below shows the consumption cost per meter. It gives the same information that was previously converted to cost. The same actions are authorised.



The cost conversion operation is simple: the price per kWh or m^3 is multiplied by the consumption in kWh or m^3.

The button permits the display of the information in the measurement unit selected (kWh or m^3).

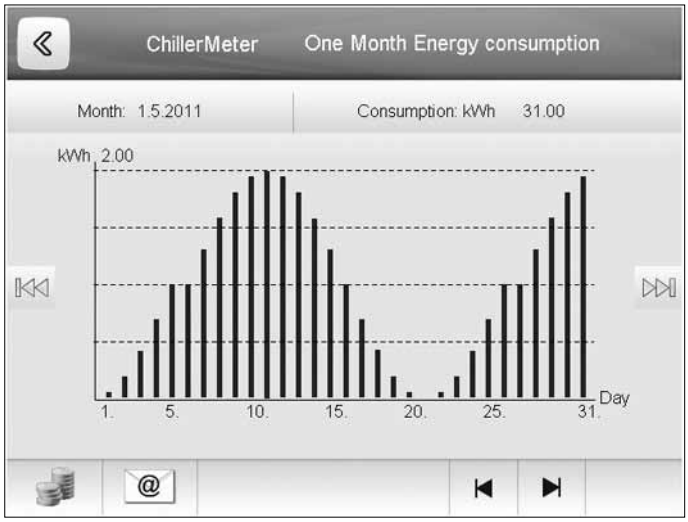
The  buttons permit display of the history for the previous or next meter.

14.5.3 - Monthly consumption history

In screen G4 press/click the "Monthly Consumption" button to access the monthly consumption history (screen G-4-3). This screen displays the day-by-day share of the monthly consumption for a meter.

The beginning of the month is displayed at the top left. The cumulative consumption for the month is displayed at the top right.

Refer to chapter 14.5.2 for the explanation of the buttons.



The conversion to cost is also available.

14.5.4 - Yearly consumption history

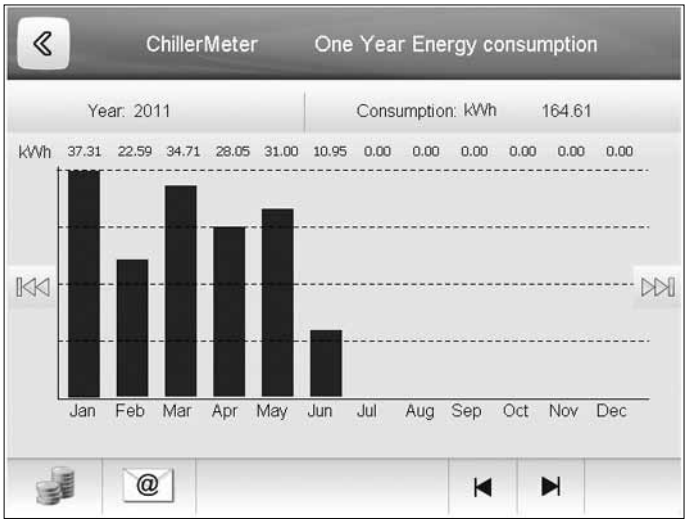
In screen G4 press/click the "Yearly Consumption" button to access the yearly consumption history (screen G-4-4).

This screen displays the month-by-month share of the yearly consumption for a meter.

The year is displayed at the top left. The cumulative consumption for the year is displayed at the top right.

The consumption for each month is displayed above each bar of the histogram.

Refer to chapter 14.5.2 for the explanation of the buttons.


ChillerMeter
One Year Energy consumption
Year: 2011
Consumption: kWh 164.61
kWh 37.31 22.59 34.71 28.05 31.00 10.95 0.00 0.00 0.00 0.00 0.00 0.00
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

The NSM keeps the consumption history for two years plus the current year.

15 - ALARM DISPLAY (SCREEN B)

In the welcome screen press/click button

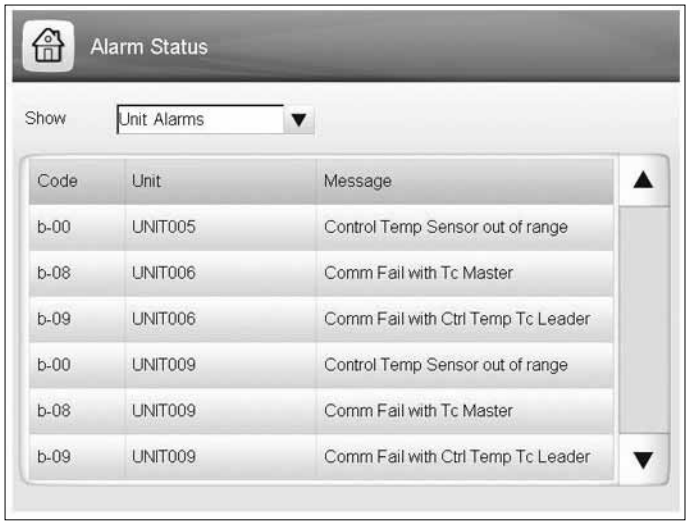
The NSM allows finding the status of the terminal unit and chiller/heat pump alarms.

The alarm button is red when a piece of CCN equipment (terminal unit, chiller or air handling unit) is in alarm condition.

The alarm display is only possible, if the NSM controls the Aquasmart system. If not, a message indicates that NSM control is deactivated.

15.1 - Terminal unit alarms

In screen B select the terminal unit alarm display in the scroll-down menu.


Alarm Status
Show
Unit Alarms
Code
Unit
Message
b-00 UNIT005 Control Temp Sensor out of range
b-08 UNIT006 Comm Fail with Tc Master
b-09 UNIT006 Comm Fail with Ctrl Temp Tc Leader
b-00 UNIT009 Control Temp Sensor out of range
b-08 UNIT009 Comm Fail with Tc Master
b-09 UNIT009 Comm Fail with Ctrl Temp Tc Leader

The up and down arrows to the right of the list allow browsing the other alarm pages.

The "b-nn" code shown in the first column is generated by the NSM and corresponds to the bit position in the alarm messages transmitted by the terminal units.

The text shown in the third column is the detailed alarm description.

To correct the alarms refer to the message for the unit concerned.

NOTE: The "c-nnn" code refers to a communication problem between the NSM and the unit shown at the CCN address "nnn".

The screen below shows that the NSM no longer communicates with the terminal unit controllers.

15.2 - Chiller/heat pump and CCN AHU alarms

In screen B select display of the chiller/heat pump and AHU alarms in the scroll-down list.

The description is the same as in the previous section 15.1.

16 - BACNET

The NSM can support the BACnet protocol (option).

16.1 - Transform a non-BACnet NSM to a BACnet NSM

Before carrying out this operation, ensure hardware compatibility of the NSM.

On the label on the rear of the unit against HW the text "A3 or higher" must be shown. If this is not the case, the NSM is not compatible. This text may be followed by /B or /C.

If it is the case first disconnect the power supply to the NSM and open its metal cover with a Phillips screwdriver.

Inside the box replace the existing SD card with an SD card that is compatible with the BACnet application. If no SD card is present in the box, insert the SD card compatible with the BACnet application.

Close the box and connect the power supply to the NSM.

After a few seconds a white screen with the message "NSMHMI.HTML not found" will be displayed. Using the Carrier S-Service tool and the latest package available, update the NSM.

16.2 - BACnet architecture

The NSM acts as a BACnet gateway. Its two CCN buses become two virtual BACnet networks and each CCN device becomes a BACnet device with its own identifier and its own objects. The NSM also has an identifier and its own objects.

This means that three BACnet networks and a maximum of 128 BACnet devices (128 NTCs max. + 8 AHUs max. + 1 chiller/heat pump + NSM) can be found by a Building Management System (BMS) device.

The NSM is connected to the local BACnet network (network number = 1601). Its instance number is unique and configurable from 1601000 to 1601999. The default is 1601000.

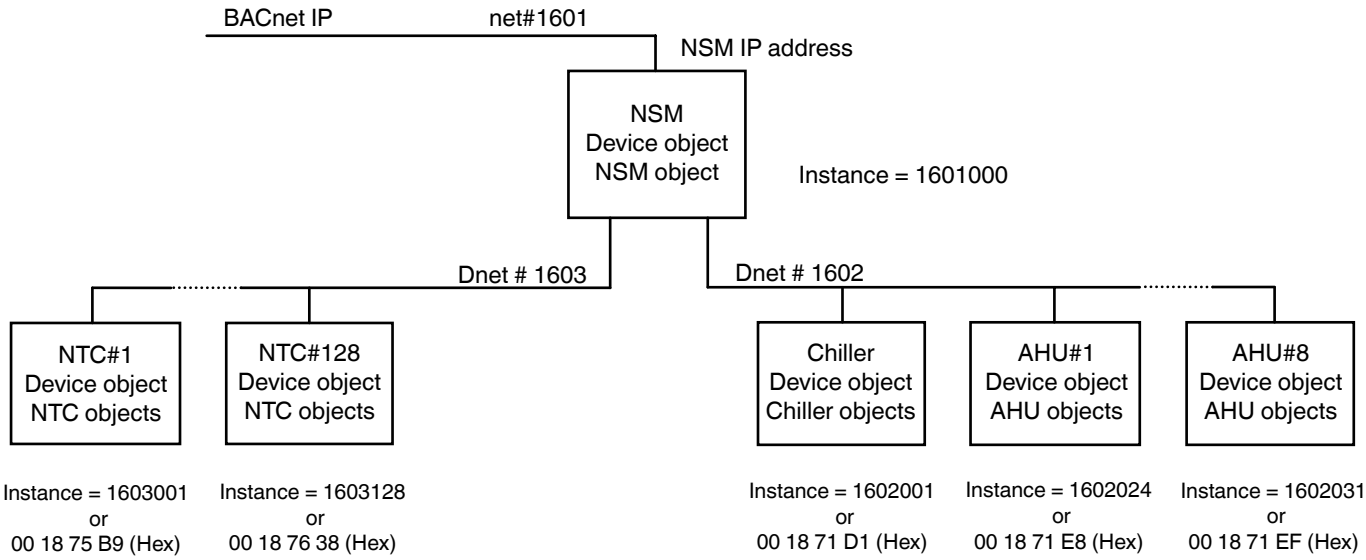
The virtual network number is made up of the "CARRIER" identifier for BACnet products (16) and a configurable network number from 2 to 99.

The default is:
- 1602 for the chiller/heat pump and the AHUs,
- 1603 for the terminal units (NTC).

The instance number for each piece of equipment (NTC, chiller/heat pump and AHU) is unique and made up of the network number (1602 to 1699) and the CCN address of the device (001 to 192), e.g. 1602001 for the chiller.

As it not possible to show all CCN points of all CCN units from the BACnet, a selection has been made (see chapter 16.3).

BACnet architecture for the Aquasmart system



Operation of the BACnet application

The CCN protocol is used to periodically read the status of all system terminal units. To ensure that the communication on this multi-master bus is not overloaded, a CCN device is read every second.

This means that the data for one piece of equipment is updated from the BACnet. This relative slowness is however not a problem for the system as it takes the comfort parameter evolution in a building into account.

To facilitate understanding the system, the name of the BACnet objects and the name of the CCN points for the equipment are the same.

The unit system configuration in the Aquasmart system also applies to the BACnet objects.

16.3 - BACnet objects of the Aquasmart system

Four object types are used in the Aquasmart system:
- Device,
- Binary Value (BV = "Binary Value" object),
- Analogue Value (AV = "Analogue Value" object),
- Notification Class (NC = "Notification class" object).

These objects are pre-defined and cannot be deleted, and it is also not possible to add any.

Certain objects support a BACnet option:
- Commandable (CMD = Commandable),
- COV (COV = Change Of Value),
- Intrinsic reporting (IR = Intrinsic Reporting).

For the "COV" option the increment value can be configured.

For the "Intrinsic reporting" option the alarm configuration and the configuration of the equipment to be notified are required for the option to be active.

The "Commandable" option permits writing a value at the "Present Value" characteristic of the object. This value is associated to a priority.

There are 16 BACnet priority levels: 1 is the highest and 16 is the lowest.

For CCN equipment of the Aquasmart system:
- The BACnet priority level corresponds to the CCN override level (1:1). If this BACnet priority level is removed, the priority level immediately below will be applied to the corresponding CCN point (a CCN "Auto" command will first be applied).
- When a CCN override level is applied from the CCN, the CCN override level will be the BACnet priority level. All other values in the BACnet priority table will be deleted.
- BACnet priority level 16 (the lowest) has no CCN equivalent and does not correspond to a CCN override. By default and as no CCN override level exists, the BACnet "Commandable" points take this priority level.

IMPORTANT:
- ***Depending on the object the "Present value" characteristic is a read or a read/write (R or RW) object. Writing an object with a "Present Value" in read only is authorised for all objects from a BACnet device, but will not have any effect on the system.***
- ***When writing the COV increment, the alarm configuration (Intrinsic Reporting) and the configuration of the equipment to be notified in case of an alarm are authorised for objects that support this option from a BACnet device, but are not saved. They must be configured from the man-machine interface of the NSM to be saved and restored in case of a sector power cut. For the COV option, the device(s) to be notified at a value change above or below the increment must periodically renew their link to the COV, as the changes would be lost if a sector power cut occurs.***
- ***For the objects that support the Commandable option, the BACnet priority levels and the associated values are lost if a sector power cut occurs.***

16.3.1 - NSM objects

The NSM includes a "Device" object and 16 pre-defined BACnet objects. For the NSM the "Device" object name is the name specified in step 4 (see chapter 6.2.4 - Information on the user site), and by default "NSM".

Name	Type	Instance	Options	Access	Description
NSMControlEnable	BV	1		RW	NSM control enable
SystemMode	AV	1	COV	R	System mode: 0 = No mode, 1 = None, 2 = Cool, 3 = Heat, 4 = Both, 5 = Cool To Heat, 6 = Heat To Cool
ProductionMode	AV	2	COV	R	Production mode: 0 = None, 1 = Delay, 2 = Cool, 3 = Heat, 4 = Both
CoolingCaller	AV	3	COV	R	Number of cooling caller: 0-100%
HeatingCaller	AV	4	COV	R	Number of heating caller: 0-100%
CoolThreshold	AV	5	COV	RW	Cool threshold: 0-100%
HeatThreshold	AV	6	COV	RW	Heat threshold: 0-100%
DigitalIntput1	BV	2		R	Digital input#1: 0 = Open, 1 = Closed
DigitalIntput2	BV	3		R	Digital input#2: 0 = Open, 1 = Closed
DigitalIntput3	BV	4		R	Digital input#3: 0 = Open, 1 = Closed
DigitalOutput1	BV	5		R	Digital output#1: 0 = Open, 1 = Closed
DigitalOutput2	BV	6		R	Digital output#2: 0 = Open, 1 = Closed
DigitalOutput3	BV	7		R	Digital output#3: 0 = Open, 1 = Closed
AlarmSystem	BV	8		R	Alarm system: 0 = Normal, 1 = Alarm
UnitSystem	BV	9		R	Unit system: 1 = Metric, 0 = Imperial
Notification	NC	1		RW	Notification class for NSM device

NOTE: The unit system modification must be made from the touch screen interface of the NSM.

16.3.2 - Objects of each terminal unit

Each terminal unit includes a "Device" object and 21 pre-defined objects. For the terminal unit the "Device" object name is the default name (UNIT001 to UNIT128)

Name	Type	Instance	Options	Access	Description
Occstat	BV	1		RW	Occupancy: 0 = Unoccupied, 1 = Occupied
oprmode	AV	1	COV	R	Operating mode: 0 = Satisfied, 1 = Cooling Demand, 3 = Heating Demand
CTRLTEMP	AV	2	COV, IR	R	Control temperature
Ctrlpnt	AV	3	COV	R	Control point
InAir	AV	4	COV	R	Air damper input: 0-100%
InCo2	AV	5	COV, IR	R	CO_2 input: 0-100%
Distatus	AV	6	COV	R	DI status: 0: DI18cDI2 Open1: DI1 Closed, 2: DI2 Closed, 3: DI18cDI2 Closed
OUTCWV	AV	7	COV	R	Cooling water valve output: 0-100%
OUTHWV	AV	8	COV	R	Heating water valve output: 0-100%
OUTFAN	AV	9	COV	R	Fan output: 0-100% or 0 = Stopped, 1 = Low, 2 = Medium, 3 = High speed
OUTEH	AV	10	COV, CMD	R	Heater output: 0 = Off, 1 = On
OUTAIR0	AV	11	COV	R	Air damper output: 0-100%
ovrmode	AV	12	COV, CMD	R	Override mode: bit2: Loadshed/bit1: OFFMode/bit0: Frost Protection 1 = Enable 0 = Disable*
Tcstatf	AV	13	COV	R	NTC status
alrmstat	AV	14	COV, IR	R	Alarm status: AlmStat1 * 65536 + AlmStat2
Mstraddr	AV	15	COV	RW	Master slave: 0-192
Occset	AV	16	COV	RW	Setpoint
Occdb	AV	17	COV	RW	Occupied deadband
Ecodb	AV	18	COV	RW	Unoccupied deadband
CommFail	BV	2	IR	R	Communication failure: 0 = Normal, 1 = Alarm
Notification	NC	1		RW	Notification class for NTC device

NOTES:

The objects distatus, ovrmode, alrmstat are generated from the CCN points:

- ***DISCIN1 and DISCIN2,***
- ***LSHDFLG and OFFMODE and FRSTPROT***
- ***almstat1 and almstat2***

16.3.3 - Chiller/heat pump object

The chiller/heat pump includes a "Device" object and 47 pre-defined objects maximum. Depending on the chiller type, this number can vary, as there is not always a CCN equivalent CCN. For the chiller/heat pump the "Device" object name is the default name (CHLR).

Name	Type	Instance	Options	Access	Description
CHIL_S_S	BV	1	CMD	RW	CCN chiller start/stop
STATUS	AV	1	COV	R	Unit run status
HC_SEL	AV	2	COV	R	Heat cool select: 0 = Cool, 1 = Heat, 2 = Auto
OAT	AV	3	COV, CMD, IR	RW	Outdoor air temperature
EWT	AV	4	COV	R	Entering water heat exchanger temperature
LWT	AV	5	COV	R	Leaving water heat exchanger temperature
CTRL_PNT	AV	6	COV	R	Control point
CAP_T	AV	7	COV	R	Percent total capacity
SCT_A	AV	8	COV	R	Saturated condensing temperature - circuit A
SST_A	AV	9	COV	R	Saturated suction temperature - circuit A
SCT_B	AV	10	COV	R	Saturated condensing temperature - circuit B
SST_B	AV	11	COV	R	Saturated suction temperature - circuit B
DP_A	AV	12	COV	R	Discharge pressure - circuit A
SP_A	AV	13	COV	R	Suction pressure - circuit A
DP_B	AV	14	COV	R	Discharge pressure - circuit B
SP_B	AV	15	COV	R	Suction pressure - circuit B
FLOW_SW or LOCK	BV	2		R	Cooler flow switch - interlock
ONOFF_SW	BV	3		R	On-off remote switch
CP_A1	BV	4		R	Compressor 1 output – circuit A
CP_A2	BV	5		R	Compressor 2 output – circuit A
CP_A3	BV	6		R	Compressor 3 output – circuit A
CP_A4	BV	7		R	Compressor 4 output – circuit A
CP_B1	BV	8		R	Compressor 1 output – circuit B
CP_B2	BV	9		R	Compressor 2 output – circuit B
CP_B3	BV	10		R	Compressor 3 output – circuit B
CP_B4	BV	11		R	Compressor 4 output – circuit B
Hr_cp_a1	AV	16	COV	R	Compressor 1 hours – circuit A
Hr_cp_a2	AV	17	COV	R	Compressor 1 hours – circuit A
Hr_cp_a3	AV	18	COV	R	Compressor 2 hours – circuit A
Hr_cp_a4	AV	19	COV	R	Compressor 3 hours – circuit A
Hr_cp_b1	AV	20	COV	R	Compressor 1 hours – circuit B
Hr_cp_b2	AV	21	COV	R	Compressor 2 hours – circuit B
Hr_cp_b3	AV	22	COV	R	Compressor 3 hours – circuit B
Hr_cp_b4	AV	23	COV	R	Compressor 4 hours – circuit B
C_PUMP1	AV	24	COV	R	Water pump 1 control
C_PUMP2	AV	25	COV	R	Water pump 2 control
CAPA_T	AV	26	COV	R	Total capacity – circuit A
CAPB_T	AV	27	COV	R	Total capacity – circuit B
Csp1	AV	28	COV	R	Cooling setpoint 1
ALM	AV	29	COV, IR	R	Alarm status
Alarm_1c	AV	30	COV, IR	R	Current alarm1
Alarm_2c	AV	31	COV, IR	R	Current alarm2
Alarm_3c	AV	32	COV, IR	R	Current alarm3
Alarm_4c	AV	33	COV, IR	R	Current alarm4
Alarm_5c	AV	34	COV, IR	R	Current alarm5
CommFail	BV	12	IR	R	Communication failure: 0 = Normal, 1 = Alarm
Notification	NC	1		RW	Notification class for chiller object

NOTE: Please refer to chapter 16.4.

16.3.4 - Objects for each air handling unit

Each air handling unit includes a "Device" object and 17 pre-defined objects. For the air handling unit "Device" object name is the default name (AHU024 to AHU031).

Name	Type	Instance	Options	Access	Description
AHU_OCC	BV	1	CMD	RW	AHU occupied?
STATUS	AV	1	COV	R	Run status
Sat	AV	2	COV	R	Supply air temperature
eat	AV	3	COV	R	Extract air temperature
ROOMT	AV	4	COV	R	Room temperature
DUCT_P	AV	5	COV	R	Duct static pressure
SATCTRL	AV	6	COV, CMD	RW	Controlled supply air temp
Sairflow	AV	7	COV	R	Actual supply air flow
Eairflow	AV	8	COV	R	Actual extract air flow
ALM	AV	9	COV, IR	R	Alarm status
Alarm_1c	AV	10	COV, IR	R	Current alarm1
Alarm_2c	AV	11	COV, IR	R	Current alarm2
Alarm_3c	AV	12	COV, IR	R	Current alarm3
Alarm_4c	AV	13	COV, IR	R	Current alarm4
Alarm_5c	AV	14	COV, IR	R	Current alarm5
CommFail	BV	2	IR	R	Communication failure: 0 = Normal, 1 = Alarm
Notification	NC	1		RW	Notification class for AHU object

NOTE: Please refer to chapter 16.4.

16.4 - Note for CCN equipment types 30RB, 30RBS, 30TH, 30WG, 30XA, 30XAS, 30XW, 39SQ

These chiller types and this air handling unit type return the operating status and/or alarm status in text format.

This information is decoded by the BACnet application and converted to a numerical value so that it can be used by a BMS.

To be able to decode this information, the texts must be in English.

For the other equipment types, please refer to the relevant user manual to find out the meaning of the numerical value.

Three correspondence tables have been defined - the first one for the equipment operating status, the second for the alarm status and the third for the alarm codes.

Operating status

BACnet code	CCN code chiller	CCN code AHU
0	Off	Off
1	Running	Running
2	Stopping	Stopping
3	Delay	Delay
4	Tripout	Tripout
5	Ready	Ready
6	Override	Override
7	Defrost	Defrost
8	Run Test	Free Cool
9	Test	Run Test
10		Fire
11		Test
12		Economy
13		Heat Up

Alarm status

BACnet code	CCN code
0	Normal
1	Partial
2	Shutdown

Alarm code

Code	Description	Calculation formula used
Compressor failures		
Ax-01	Compressor Ax motor temperature too high Comp. Ax failed: motor protection Kriwan safety open	The code of alarms Ax-nn is calculated as follows: Code = 1000 + 100 * x + nn Example for alarm A1-03: x = 1 and nn = 3 NSM alarm code corresponds to A1-03 = 1103
Ax-02	Compressor Ax crankcase heater failure Compressor A motor temperature out of range	
Ax-03	Compressor Ax high pressure switch	
Ax-04	Compressor Ax motor temperature sensor PTC out of range Compressor A overcurrent	
Ax-05	Compressor Ax power reset Compressor A locked rotor	
Ax-06	Compressor Ax low control voltage alert Compressor A phase loss L1	
Ax-07	Compressor Ax phase loss L2	
Ax-08	Compressor Ax phase loss L3	
Ax-09	Compressor Ax low current alarm	
Ax-10	Compressor Ax Y delta starter current increase failure alarm	
Ax-11	Compressor Ax contactor failure	
Ax-12	Compressor Ax unable to stop motor	
Ax-13	Compressor Ax phase reversal	
Ax-14	Compressor Ax MTA configuration fault	
Ax-15	Compressor Ax configuration switch mismatch	
Ax-16	Compressor Ax unexpected switch setting change	
Ax-17	Compressor Ax power on reset	
Ax-18	Compressor Ax UL 1998 critical section software error	
Ax-19	Compressor Ax UL 1998 current measure dual channel mismatch	
Bx-01	Compressor Bx motor temperature too high	The code of alarms Bx-nn is calculated as follows: Code = 2000 + 100 * x + nn Example for alarm B2-13: x = 2 and nn = 13 NSM alarm code corresponds to B2-13 = 2213
Bx-02	Compressor Bx crankcase heater failure Compressor Bx motor temperature out of range	
Bx-03	Compressor Bx high pressure switch	
Bx-04	Compressor Bx motor temperature sensor PTC out of range Compressor Bx overcurrent	
Bx-05	Compressor Bx power reset Compressor Bx locked rotor	
Bx-06	Compressor Bx low control voltage alert Compressor Bx phase loss L1	
Bx-07	Compressor Bx phase loss L2	
Bx-08	Compressor Bx phase loss L3	
Bx-09	Compressor Bx low current alarm	
Bx-10	Compressor Bx Y delta starter current increase failure alarm	
Bx-11	Compressor Bx contactor failure	
Bx-12	Compressor Bx unable to stop motor	
Bx-13	Compressor Bx phase reversal	
Bx-14	Compressor Bx MTA configuration fault	
Bx-15	Compressor Bx configuration switch mismatch	
Bx-16	Compressor Bx unexpected switch setting change	
Bx-17	Compressor Bx power on reset	
Bx-18	Compressor Bx UL 1998 critical section software error	
Bx-19	Compressor Bx UL 1998 current measure dual channel mismatch	
Cx-01	Compressor Cx motor temperature too high	The code of alarms Cx-nn is calculated as follows: Code = 3000 + 100 * x + nn Example for alarm C4-09: x = 4 and nn = 9 NSM alarm code corresponds to C4-09 = 3409
Cx-02	Compressor Cx crankcase heater failure Compressor Cx motor temperature out of range	
Cx-03	Compressor Cx high pressure switch	
Cx-04	Compressor Cx motor temperature sensor PTC out of range Compressor Cx overcurrent	
Cx-05	Compressor Cx Power reset compressor Cx locked rotor	
Cx-06	Compressor Cx low control voltage alert Compressor Cx phase loss L1	
Cx-07	Compressor Cx phase loss L2	
Cx-08	Compressor Cx phase loss L3	
Cx-09	Compressor Cx low current alarm	
Cx-10	Compressor Cx Y delta starter current increase failure alarm	
Cx-11	Compressor Cx contactor failure	
Cx-12	Compressor Cx unable to stop motor	
Cx-13	Compressor Cx phase reversal	
Cx-14	Compressor Cx MTA configuration fault	
Cx-15	Compressor Cx configuration switch mismatch	
Cx-16	Compressor Cx unexpected switch setting change	
Cx-17	Compressor Cx power on reset	
Cx-18	Compressor Cx UL 1998 critical section software error	
Cx-19	Compressor Cx UL 1998 current measure dual channel mismatch	

Code	Description	Calculation formula used
Communication failures		
Co-Ax	Loss of communication with compressor board Ax	The code of alarms Co-Yx is calculated as follows: Code = 4000 + x or last number If -A add 100 If -B add 200 If -C add 300 If -E add 400 If -F add 500 If -O add 600 If -V add 700 If Dr add 800 Example for alarm Co-O2: x = 2 and -O NSM alarm code corresponds to Co-O2 = 4602 Example for alarm Co-V1: x = 1 et -V NSM alarm code corresponds to Co-V1 = 4701
Co-Bx	Loss of communication with compressor board Bx	
Co-Cx	Loss of communication with compressor board Cx	
Co-Ex	Loss of communication with EXV board number x	
Co-Fx	Loss of communication with fan board number x	
Co-O1	Loss of communication with auxiliary board number 1 Loss of communication with free cooling board 1	
Co-O2	Loss of communication with auxiliary board number 2 Loss of communication with free cooling board 2 Loss of communication with electric heater board	
Co-O3	Loss of communication with energy management board	
Co-O4	Loss of communication with heat reclaim board Loss of communication with heat reclaim board	
Co-O5	Loss of communication with Free cooling board circuit A	
Co-O6	Loss of communication with Free cooling board circuit B	
Co-O7	Loss of communication with Free cooling board circuit C	
Co-Vx	Loss of communication with drive X	
CoDr1	Loss of communication with drive 1	
CoDr2	Loss of communication with drive 2	
CoDr3	Loss of communication with drive 3	
Ct-01	Circuit A welded contactor failure	The code of alarms Co-Yx is calculated as follows: Code = 6000 + nn Example for alarm Ct-02: nn = 2 NSM alarm code corresponds to Ct-02 = 6002
Ct-02	Circuit B welded contactor failure	
Ct-03	Circuit C welded contactor failure	
FC-01	Illegal factory configuration number #1 to nn	The code of alarms FC-nn is calculated as follows: Code = 7000 + nn Example for alarm FC-01: nn = 1 NSM alarm code corresponds to FC-01 = 7001 The code of alarm FC-nO is 8000
FC-nO	No factory configuration	
MC-01	Master chiller configuration error number #1 to nn	The code of alarms MC-nn is calculated as follows: Code = 9000 + nn Example for alarm MC-01: nn = 1 NSM alarm code corresponds to MC-01 = 9001
Running failures		
P-01	Water heat exchanger freeze protection	The code of alarms P-nn is calculated as follows: Code = 10000 + nn Example for alarm P-12: nn = 12 NSM alarm code corresponds to P-12 = 10012
P-02	Circuit A condenser freeze protection	
P-03	Circuit B condenser freeze protection	
P-04	Circuit C condenser freeze protection	
P-05	Circuit A low suction temperature	
P-06	Circuit B low suction temperature	
P-07	Circuit C low suction temperature	
P-08	Circuit A high superheat	
P-09	Circuit B high superheat	
P-10	Circuit C high superheat	
P-11	Circuit A low superheat	
P-12	Circuit B low superheat	
P-13	Circuit C low superheat	
P-14	Cooler interlock failure	
P-15	Condenser flow switch failure	
P-16	Compressor A1 not started or pressure increase not established	
P-17	Compressor A2 not started or pressure increase not established	
P-18	Compressor A3 not started or pressure increase not established	
P-19	Compressor A4 not started or pressure increase not established	
P-20	Compressor B1 not started or pressure increase not established	
P-21	Compressor B2 not started or pressure increase not established	
P-22	Compressor B3 not started or pressure increase not established	
P-23	Compressor B4 not started or pressure increase not established	
P-24	Compressor C1 not started or pressure increase not established	
P-25	Compressor C2 not started or pressure increase not established	
P-26	Compressor C3 not started or pressure increase not established	
P-27	Compressor C4 not started or pressure increase not established	
P-28	Control box thermostat or power reverse phase detection Customer interlock failure	
P-29	Loss of communication with NSM	
P-30	Master/slave communication failure	
P-31	Unit is in CCN emergency stop	
P-32	Water pump #1 default	
P-33	Water pump #2 default	
P-34	Circuit A reclaim operation failure	
P-35	Circuit A reclaim operation failure	

Code	Description	Calculation formula used
Running failures (continued)		
P-37	Circuit A - repeated high discharge gas overrides Circ A – high condensing temperature out of compressor map	The code of alarms P-nn is calculated as follows: Code = 10000 + nn Example for alarm P-12: nn = 12 NSM alarm code corresponds to P-12 = 10012
P-38	Circuit B – repeated high discharge gas overrides Circ B – high condensing temperature out of compressor map	
P-39	Circuit C – repeated high discharge gas overrides Circ C – high condensing temperature out of compressor map	
P-40	Circuit A – repeated low suction temp overrides Circuit A – repeated low suction temp overrides	
P-41	Circuit B – repeated low suction temp overrides Circuit B – repeated low suction temp overrides	
P-42	Circuit C – repeated low suction temp overrides Circuit C – repeated low suction temp overrides	
P-43	Low entering water temperature in heating	
P-50	Refrigerant leakage detection	
P61-x	Condenser water loop process failure	The code of alarms P6y-x is calculated as follows: Code = 11000 + y * 100 + x Example for alarm P61-1: y = 1 and x = 1 NSM alarm code corresponds to P61-1 = 11101
P62-x	Water loop process failure	
P-63	Circuit A high pressure switch failure	The code of alarms P-nn is calculated as follows: Code = 10000 + nn Example for alarm P-201: nn = 201 NSM alarm code corresponds to P-201 = 10201
P-64	Circuit B high pressure switch failure	
P-67	Circuit A low oil pressure	
P-68	Circuit B low oil pressure	
P-69	Circuit C low oil pressure	
P-70	Circuit A Max. oil filter differential pressure	
P-71	Circuit B Max. oil filter differential pressure	
P-72	Circuit C Max. oil filter differential pressure	
P-73	Condenser pump #1 fault	
P-74	Condenser pump #2 fault	
P-75	Circuit A low oil level	
P-76	Circuit B low oil level	
P-77	Circuit C low oil level	
P-78	Circuit A high discharge temperature	
P-79	Circuit B high discharge temperature	
P-80	Circuit C high discharge temperature	
P-81	Circuit A low Economizer pressure or suction valve closed	
P-82	Circuit B low Economizer pressure or suction valve closed	
P-83	Circuit C low Economizer pressure or suction valve closed	
P-84	Circuit A high oil filter drop pressure	
P-85	Circuit B high oil filter drop pressure	
P-86	Circuit C high oil filter ddrop pressure	
P-87	Circuit A slide valve control unverifiable	
P-88	Circuit B slide valve control unverifiable	
P-89	Circuit C slide valve control unverifiable	
P-90	Cooler flow switch setpoint configuration failure	
P-91	Circuit A free cooling valve incoherent position Cooler flow switch failure	
P-92	Circuit B free cooling valve incoherent position	
P-93	Circuit C free cooling valve incoherent position	
P-94	Circuit A free cooling operation failure	
P-95	Circuit B free cooling operation failure	
P-96	Circuit C free cooling operation failure	
P-97	Water heat exchanger temperature sensors swapped Cooler water heat exchanger temperature sensors swapped	
P-98	Condenser water heat exchanger temperature sensors swapped	
P-99	Refrigerant leakage detection	
P-100	Incorrect indoor fan status	
P-201	Low supply air temperature alarm	
P-202	Heat exchanger failure	
P-203	Extract fan failure	
P-204	Supply fan failure	
P-205	Electric pre-heater maximum temp alarm	
P-206	Electric heater, maximum temp alarm	
P-207	Frost protection of preheat hot water coil	
P-208	Frost protection of booster hot water coil	
P-209	External fire	

Code	Description	Calculation formula used
Transducer failures		
Pr-01	Circuit A discharge transducer failure	The code of alarms Pr-nn is calculated as follows: Code = 12000 + nn Example for alarm Pr-202: nn = 202 NSM alarm code corresponds to Pr-202 = 12202
Pr-02	Circuit B discharge transducer failure	
Pr-03	Circuit C discharge transducer failure	
Pr-04	Circuit A suction transducer failure	
Pr-05	Circuit B suction transducer failure	
Pr-06	Circuit C suction transducer failure	
Pr-07	Circuit A reclaim pumpdown pressure transducer	
Pr-08	Circuit B reclaim pumpdown pressure transducer	
Pr-10	Circuit A oil pressure transducer	
Pr-11	Circuit B oil pressure transducer	
Pr-12	Circuit C oil pressure transducer	
Pr-13	Circuit A Economizer pressure transducer	
Pr-14	Circuit B Economizer pressure transducer	
Pr-15	Circuit C Economizer pressure transducer	
Pr-16	Circuit A free-cooling pump inlet pressure transducer	
Pr-17	Circuit A free-cooling pump outlet pressure transducer	
Pr-18	Circuit B free-cooling pump inlet pressure transducer	
Pr-19	Circuit B free-cooling pump outlet pressure transducer	
Pr-20	Circuit C free-cooling pump inlet pressure transducer	
Pr-21	Circuit C free-cooling pump outlet pressure transducer	
Pr-22	Circuit A heat pump approach pressure transducer	
Pr-23	Circuit B heat pump approach pressure transducer	
Pr-24	Water pressure 1 transducer failure Water heat exchanger lLeaving fluid transducer	
Pr-25	Water pressure 2 transducer failure	
Pr-26	Water pressure 3 transducer failure	
Pr-27	Water pressure 4 transducer failure	
Pr-28	Water pressure too high	
Pr-29	Water pressure too low - pump cavitation risks	
Pr-30	Water filter dirty	
Pr-201	Supply air pressure transducer failure	
Pr-202	Pressure drop across supply fan transducer failure	
Pr-203	Pressure drop across extract fan transducer failure	
Pr-204	Pressure drop across heat exchanger transducer failure	
Sr-nn	Service maintenance alert number # nn	The code of alarms Sr-nn is calculated as follows: Code = 13000 + nn Example for alarm Sr-201: nn = 201 NSM alarm code corresponds to Sr-201 = 13201
Other sensor failures		
se-201	Room pollution sensor failure	The code of alarms se-nn is calculated as follows: Code = 14000 + nn Example for alarm Sr-201: nn= 1 NSM alarm code corresponds to se-1= 14001
se-202	Adiabatic cooler sensor failure	
se-1	Setpoint offset potentiometer failure	
Thermistor failures		
th-01	Water heat exchanger entering fluid thermistor	The code of alarms th-nn is calculated as follows: Code = 15000 + nn Example for alarm th-34: nn = 34 NSM alarm code corresponds to th-34 = 15034
th-02	Water heat exchanger leaving fluid thermistor	
th-03	Circuit A defrost thermistor failure	
th-04	Circuit B defrost thermistor failure	
th-06	Condenser entering fluid thermistor failure	
th-07	Condenser leaving fluid thermistor failure	
th-08	Reclaim condenser entering thermistor failure	
th-09	Reclaim condenser leaving thermistor failure	
th-10	OAT thermistor failure	
th-11	Master/slave common fluid thermistor failure	
th-12	Circuit A suction gas thermistor failure	
th-13	Circuit B suction gas thermistor failure	
th-14	Circuit C suction gas thermistor failure	
th-15	Circuit A discharge gas thermistor failure	
th-16	Circuit B discharge gas thermistor failure	
th-17	Circuit C discharge gas thermistor Failure	
th-18	Circuit A condenser subcooling liquid thermistor failure	
th-19	Circuit B condenser subcooling liquid thermistor failure	
th-21	Space temperature thermistor failure	
th-23	Cooler heater feedback thermistor failure	
th-24	Circuit A Economizer gas thermistor failure	
th-25	Circuit B Economizer gas thermistor failure	
th-26	Circuit C Economizer gas thermistor failure	
th-30	Circuit A free-cooling liquid thermistor failure	
th-31	Circuit B free-cooling liquid thermistor failure	
th-32	Master/slave common heat fluid thermistor failure	

Code	Description	Calculation formula used
Thermistor failures (continued)		
th-33	Circuit A compressor motor thermistor failure	The code of alarms th-nn is calculated as follows: Code = 15000 + nn Example for alarm th-34: nn = 34 NSM alarm code corresponds to th-34 = 15034
th-34	Circuit B compressor motor thermistor failure	
th-35	Circuit C compressor motor thermistor failure	
th-36	Drycooler leaving thermistor failure	
th-201	Inlet air thermistor failure	
th-202	Supply air thermistor failure	
th-203	Exctract air thermistor failure	
th-204	Room thermistor failure	
Drive failures		
V0-01	Circuit A variable speed fan failure Circuit A VLT fan drive failure	The code of alarms Vy-nn is calculated as follows: Code = 16000 + y * 100 + nn Example for alarm V2-01: y = 2 and x = 1 NSM alarm code corresponds to V2-01 = 16201
V1-01	Circuit B variable speed fan failure Circuit B VLT fan drive failure	
V2-01	Circuit C variable speed fan failure Circuit C VLT fan drive failure	
V3-01	Water pump variable speed fan failure	
V4-01	Condenser water pump variable speed fan failure	
Drive warnings		
W0-01	Circuit A variable speed fan warning Circuit A VLT drive warning	The code of alarms Wy-nn is calculated as follows: Code = 17000 + y * 100 + nn Example for alarm W4-01: y = 4 and x = 1 NSM alarm code corresponds to W4-01 = 17401
W1-01	Circuit B variable speed fan warning Circuit B VLT drive warning	
W2-01	Circuit C variable speed fan warning Circuit C VLT drive warning	
W3-01	Water pump variable speed warning	
W4-01	Condenser water pump variable speed warning	
Power failures		
BATT	Battery low or missing. Change it quickly	The code of alarm BATT is 18000
Database module failures		
DB-01	Database module failure	The code of alarms DB-nn is calculated as follows: Code = 19000 + nn Example for alarm DB-01: nn = 1 NSM alarm code corresponds to DB-01 = 19001
Lenscan module failures		
LS-01	Lenscan module failure	The code of alarms FS-nn is calculated as follows: Code = 20000 + nn Example for alarm LS-01: nn = 1 NSM alarm code corresponds to LS-01 = 20001

16.5 - BACnet Protocol Implementation Conformance Statement (PICS)

16.5.1 - Product description

The Aquasmart system permits comfort control inside buildings. It is linked to a chiller/heat pump, to NTC controllers installed on the fan coil units and to an air handling unit. The Aquasmart system acts as a BACnet gateway for the Carrier equipment. The devices are shown in virtual form and divided into two BACnet networks.

16.5.2 - BACnet standardised device profile

	BACnet Operator Workstation (B-OWS)
	BACnet Building Controller (B-BC)
	BACnet Advanced Application Controller (B-AAC)
	BACnet Application Specific Controller (B-ASC)
	BACnet Smart Sensor (B-SS)
	BACnet Smart Actuator (B-SA)
X	BACnet Gateway (B-GW)

16.5.3 - BACnet Interoperability Building Blocks (BIBB) supported

Data Sharing BIBBs	
Data Sharing Read-Property-B	DS-RP-B
Data Sharing Write-Property-B	DS-WP-B
Data Sharing COV-B	DS-COV-B

Alarm/Event BIBBs	
Alarm and Event-Notification Internal-B	AE-N-I-B

Network Management BIBBs	
Network Management-Connection Establishment-B	NM-CE-B

16.5.4 - Segmentation capability

Segmented requests supported	Window Size	16
Segmented responses supported	Window Size	16

16.5.5 - Standard object types supported

Standard Object Types Supported: Analogue-Value-Object				
Dynamically creatable	Dynamically deletable	Optional properties supported	Writable properties	Proprietary properties
X	X	Description Reliability Priority_Array Relinquish_Default COV_Increment Time_Delay Notification_Class High_Limit Low_Limit Deadband Limit_Enable Event_Enable Acked_Transitions Notify_Type Event_Time_Stamps	Present_Value COV_Increment Time_Delay High_Limit Low_Limit Deadband Limit_Enable Event_Enable	-

Standard Object Types Supported: Binary-Value-Object				
Dynamically creatable	Dynamically deletable	Optional properties supported	Writable properties	Proprietary properties
X	X	Description Reliability Inactive_Text Active_Text Change_Of_State_Time Change_Of_State_Count Time_Of_State_Count_Reset Elapsed_Active_Time Time_Of_Active_Time_Reset Minimum_Off_Time Minimum_On_Time Priority_Array Relinquish_Default Time_Delay Notification_Class Alarm_Value Event_Enable Acked_Transitions Notify_Type Event_Time_Stamps	Present_Value Time_Delay Event_Enable	-

Standard Object Types Supported: Device-Object				
Dynamically creatable	Dynamically deletable	Optional properties supported	Writable properties	Proprietary properties
N/A	N/A	Location Description Active_COV_Subscriptions	Time _Synchronization _Recipients Backup _Failure_Timeout	-

Standard Object Types Supported: Multistate-Value-Object				
Dynamically creatable	Dynamically deletable	Optional properties supported	Writable properties	Proprietary properties
X	X	Description Reliability State_Text Priority_Array Relinquish_Default Time_Delay Notification_Class Alarm_Values Fault_Values Event_Enable Acked_Transitions Notify_Type Event_Time_Stamps	Present_Value Time_Delay Alarm_Values Fault_Values Event_Enable	-

16.5.6 - Device address binding

Is static device binding supported ? (This is currently neccessary for two-way communication with MS/TP slaves and certain other devices.)

Yes [ ] No [X]

16.5.7 - Data link layer options

- [X] BACnet IP
- [ ] BACnet IP, Foreign Device
- [ ] ISO 8802-3, Ethernet (Clause 7)
- [ ] ASTM 878.1, 2.5 Mb. ARCNET (Clause 8)
- [ ] ASTM 878.1, RS-485 ARCNET (Clause 8) baud rate(s): _____
- [ ] MS/TP master (Clause 9), baud rate(s): _____
- [ ] MS/TP slave (Clause 9), baud rate(s): _____
- [ ] Point-To-Point, EIA 232 (Clause 10), baud rate(s): max. EIA 232
- [ ] Point-To-Point, modem, (Clause 10), baud rate(s): 115200 baud / max. modem
- [ ] LonTalk, (Clause 11), medium: _____
- [ ] Other: _____

16.5.8 - Networking options

Router, Clause 6 - BACnet/IP-PTP
Annex H, BACnet Tunneling Router over IP
BACnet Broadcast Management Device (BBMD)
Does the BBMD support registrations by Foreign Devices? Yes [ ] No [X]

16.5.9 - Character sets supported

Indicating support for multiple character sets does not imply that they can all be supported simultaneously.

- [X] ANSI X3.4 / UTF8
- [ ] ISO 10646 (UCS-2)
- [ ] IBMTM /MicrosoftTM DBCS
- [ ] ISO 10646 (ICS-4)
- [ ] ISO 8859-1
- [ ] JIS C 6226

17 - NSM INTERFACE/CCN TABLES

This section addresses Advanced users (Carrier engineers).

The NSM CCN address is 0.65 by default and the communication speed is 9600 baud. The NSM CCN tables are available via a Carrier service tool on the primary bus.

The CCN tables present in the NSM permit reading of the system and NTC controller status. The parameter description is in English and cannot be translated. No table permits configuration of the system.

17.1 - Table: SMSTATUS, PIC TYPE TABLE: 11H, example 1

Each controller has its own maintenance table. The table name contains the CCN address of the NTC (e.g. NTC001 corresponds to the NTC with the CCN address 1).

	DESCRIPTION	STATUS	UNIT	POINT
1	SM global parameters			
2	SM Control Enabled	No/Yes	-	smcntrl
3 4 5	Piping Configuration 0 = 2 pipes, 1 = 4 pipes, 2 = 2 pipes + 2 pipes	0 to 2	-	pipecfg
6 7 8 9	Cooling/Heating Source 0 = Chiller, 1= Heat pump, 2 = Chiller + Boiler, 3 = Heat pump + Boiler	0 to 3		Chlr_blr
10	Cool Mode Threshold	0 to 100	-	clthres
11	Heat Mode Threshold	0 to 100	-	htthres
12	Cool Current Demand	0 to 100	-	cldemand
13	Heat Current Demand	0 to 100	-	htdemand
14 15 16 17 18	System Mode 0 = No mode, 1 = None, 2 = Cool, 3 = Heat, 4 = Both, 5 = Cool to Heat, 6 = Heat to Cool	0 to 6	-	sysmode
19 20 21	Production Mode 0 = None, 1 =Delay, 2 = Cool, 3 = Heat, 4 = Both	0 to 4	-	prodmode
22	Smart Start	Off/On	-	smartstart
23	Loadshed Enable	No/Yes	-	LoadshEn
24	System Alarm	Normal	-	SYS_ALM
25				
26	**Chiller/Heatpump**			
27	EWT	-40 to 245	°C	ewt
28	LWT	-40 to 245	°C	lwt
29	Chiller Start/Stop	Stop/Start	-	chil_s_s
30	Chiller Available	No/Yes	-	ccnchcom
31 32 33	Heat/Cool select 0 = Cool, 1 = Heat, 2 = Auto, 3 = Both	0 to 3	-	hc_sel
34	Chiller Alarm Status	Normal	-	chil_alm
35			-	
36	**Air handling unit**		-	
37	AHU(s) Alarm Status	Normal	-	ahu_alm
38				
39	**Units**			
40	NTCs in Database	1 to 128	-	numntc
41	NTC in Alarm at Address	0	-	ntc_alm

NOTE: The SYS_ALM point indicates if an NTC, the chiller/heat pump or at least one air handling unit is in the alarm condition.

This point can be read with a "Read Variable" CCN command.

17.2 - Table: SMDIDO, PIC TYPE TABLE: 11H, example 2

	DESCRIPTION	STATUS	UNITS	POINT
1	Digital Output 1	Off/On	-	do1
2	Digital Output 2	Off/On	-	do2
3	Digital Output 3	Off/On	-	do3
4				
5	Digital Input 1	Open/Close	-	di1
6	Digital Input 2	Open/Close	-	di2
7	Digital Input 3	Open/Close	-	di3
8				
9	Meter Input 1	0	-	ci1
10	Meter Input 2	0	-	ci2
11	Meter Input 3	0	-	ci3

17.3 - Table: NTCMAINT, PIC TYPE TABLE: 15H example 1, and Table: NTC001 to NTC128, PIC TYPE TABLE: 641H, example 1 to 128

	DESCRIPTION	STATUS	UNITS	POINT
1	Name		-	name
2	Occupancy Mode	0 to 1	-	occmode
3	Operating Mode	0 to 2	-	opmode
4	Control Temp		°C	ctrltemp
5	Control Deadband		^C	ctrldb
6	Control Point		°C	ctrlpnt
7	Communication Failure	No/Yes	-	comfail
8	Alarm Status	Normal/Alarm	-	almstat

17.4 - Table: AHUMAINT, PIC TYPE TABLE: 15H example 2, and Table: AHU024 to AHU031, PIC TYPE TABLE: 642H, example 1 to 8

Each AHU has its own maintenance table. The table name contains the CCN address of the AHU (e.g. AHU024 corresponds to the AHU with the CCN address 24).

	DESCRIPTION	STATUS	UNITS	POINT
1	Name		-	name
2	AHU occupied?	No	-	Ahu_occ
3	Control Status	0	-	Satstate
4	Controlled Supply temp	-40.0	°C	Satctrl
5	Supply Fan Control Point	0	%	Sfanrate
6	Extract Fan Control Point	0	%	Efanrate
7	Outdoor Air Temperature	-40	°C	Oat
8	Inlet Air Temperature	-40	°C	Iat
9	Supply Air Temperature	-40	°C	Sat
10	Extract Air Temperature	-40	°C	Eat
11	Room Temperature	-40	°C	Roomt
12	Heat Recovery Command	0	%	Hr_cmd
13	Pre-heater HWC Valve	0	%	Phwcvalv
14	Electrical Pre-Heat Pulse	0	%	Elpr_ao
15	ReHeater HWC Valve	0	%	Bhwcvalv
16	Electrical Heater Pulse	0	%	Elbo_ao
17	Cooler Valve	0	%	bcwcvalv
18	Communication Failure	No	-	Comfail
19	Alarm Status	Normal	-	almstat

18 - COLOUR TOUCH SCREEN INTERFACE PARAMETER SETTING

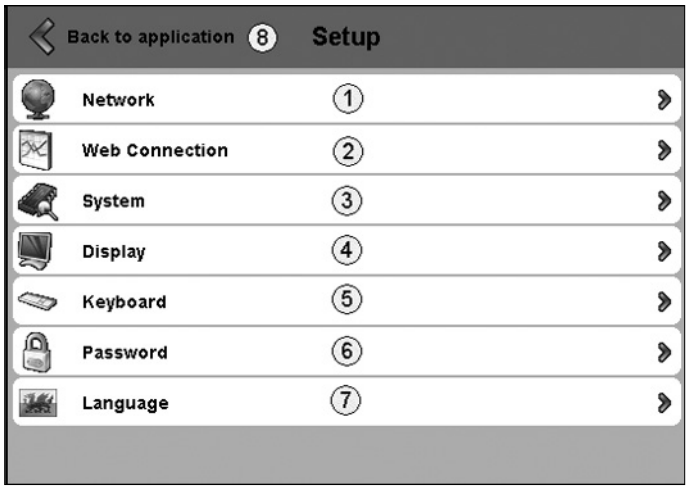
18.1 - Main configuration menu

The "Setup" display is only possible on the NSM touch screen.

To access the main cofiguration menu press anywhere and any time on the screen (except zones with buttons or text fields) for 4 seconds.

By default access to the menu is not password-protected.

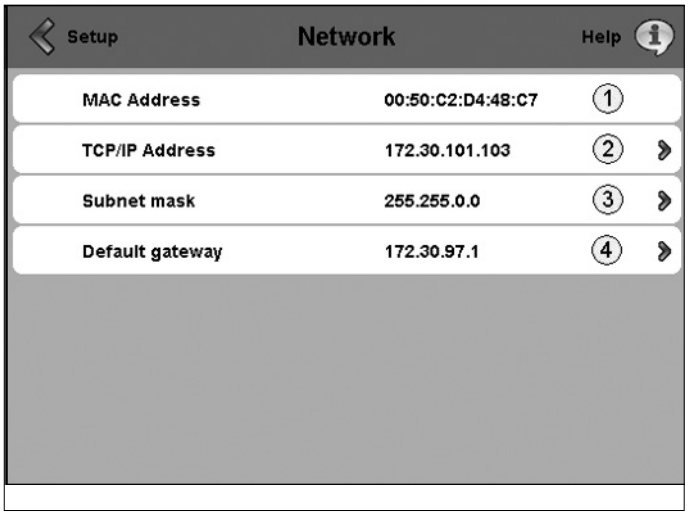
The main configuration screen permits access to the various parameters of the NSM:



1	System properties for the Ethernet interface
2	Connection configuration, web welcome page
3	System: Software version, Buzzer
4	Display: Contrast, backlighted
5	Keyboad: Not applicable
6	Languages: for "Setup" only
7	Password for "Setup" access
8	Return to application

18.2 - Find and modify the NSM IP address

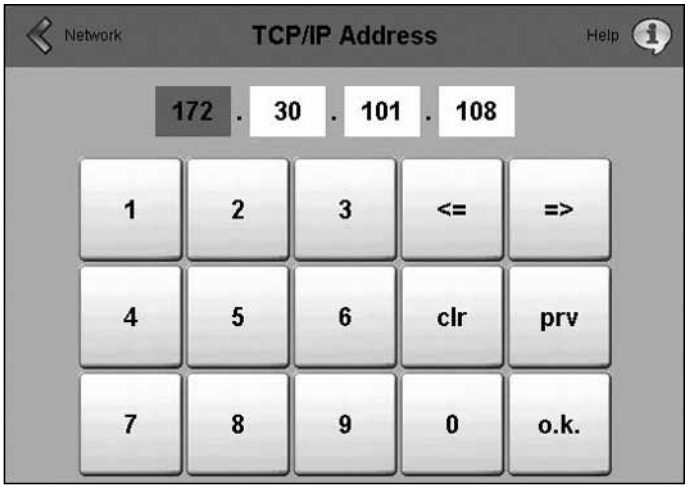
In the main configuration menu (see chapter 18.1) press on the network field "Network"to display the screen below.



IMPORTANT: You must request an IP address, the subnet mask and the default gateway from the system administrator before connecting the NSM to the local Ethernet network.

1	MAC address (read only)
2	IP address
3	Subnet mask
4	Default gateway

Press on the first line with the IP address.



Enter the new address and validate it by pressing "OK". Proceed in the same way with the other network parameters.

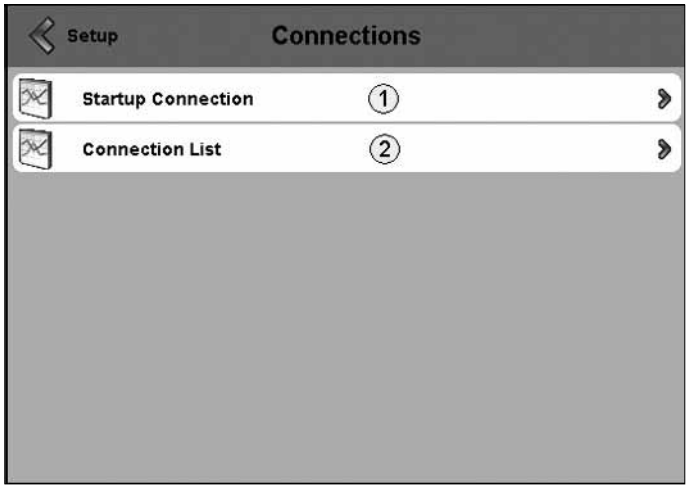
Return to the application and save.

NOTE: It is necessary to restart the NSM so that it takes the new network parameters into consideration.

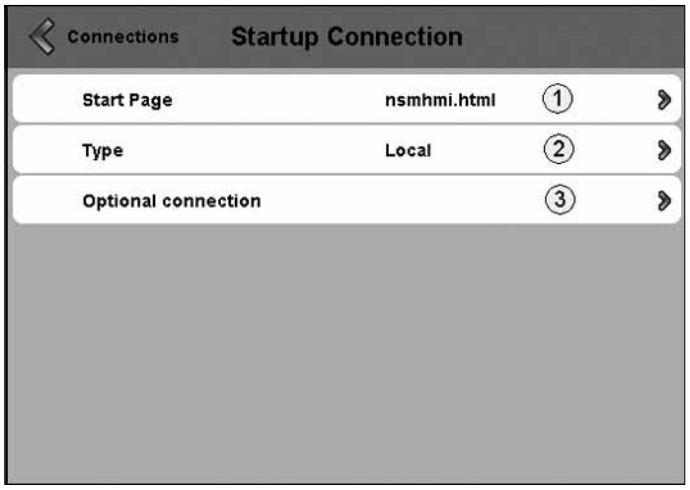
18.3 - Configuration of the web connection

This configuration is carried out at the factory and is not normally modified.

In the main configuration menu (see section 18.1) press on the "Configuration" field. The screen below is displayed:



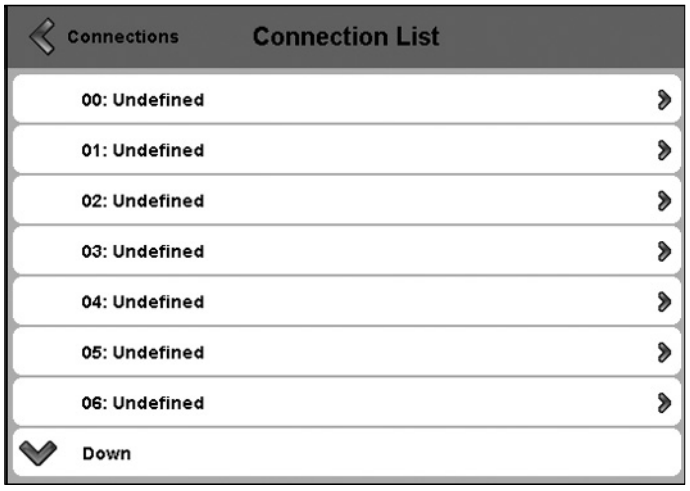
Press the first field and the screen below is dsplayed.



Default parameters for the NSM application. Press a parameter to modify it if it does not agree with the screen above.

1	Start page name: nsmhmi.html
2	The connection type must be controlled in Local
3	Optional connection: Not applicable to the NSM

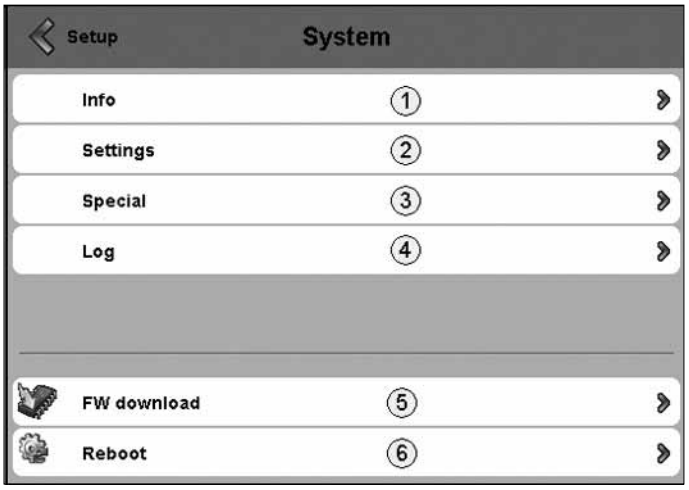
Return to the previous screen. Press in the second field; the screen below will now be displayed.



No optional connection has been defined.

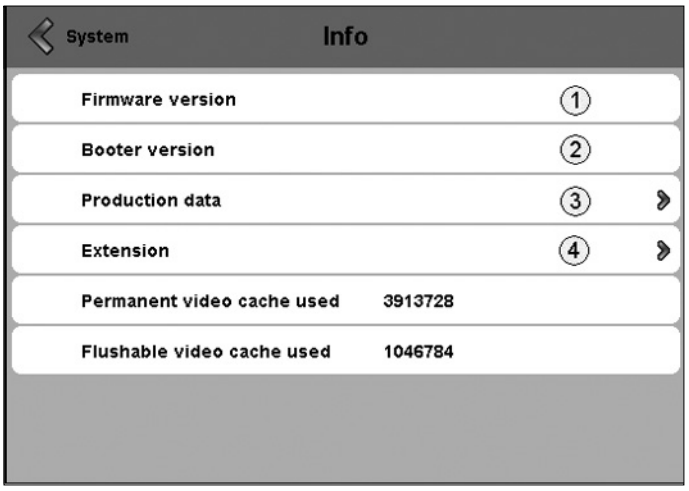
18.4 - System configuration and buzzer

In the main configuration menu (see section 18.1) press on the "System" field. The screen below is displayed:



1	Software version information
2	Buzzer parameters
3	Reset to zero and flash formating, clock parameters (do not modify)
4	Unit start-up history
5	Firmware update: Not applicable
6	Unit reboot

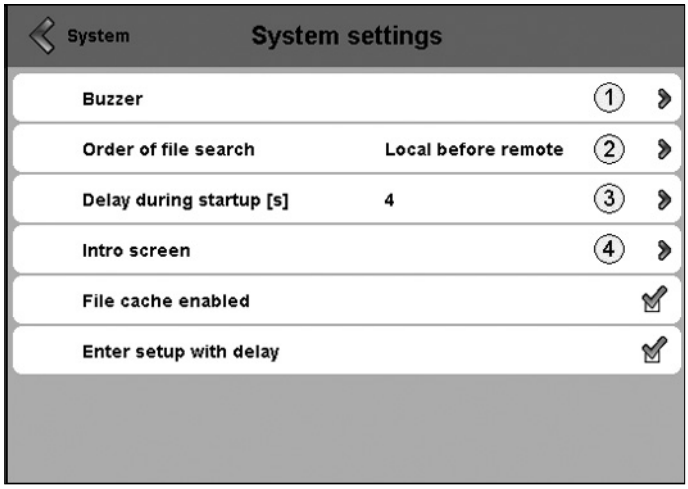
Press on the first field of the system screen to display the system software versions as well as the unit serial number.



1	"Operating System" version
2	"Boot" software version
3	Serial number, MAC address, hardware version
4	Input/output board extension, version

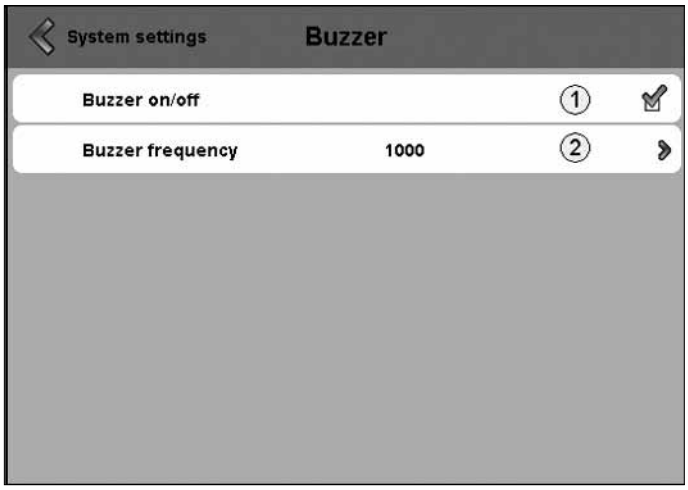
Return to the previous screen "System".

Press the second field of the "Settings" screen to display the buzzer configuration and the start-up information.



1	Buzzer configuration
2	Interface order: local before remote (do not modify)
3	Start-up delay time (do not modify)
4	Information on the system start-up screen

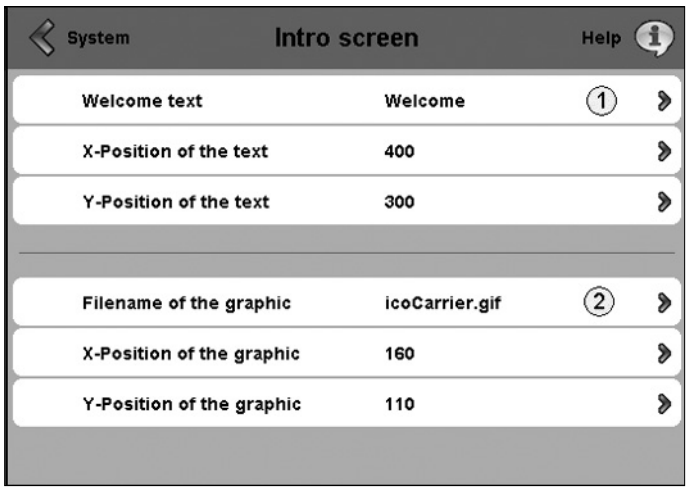
Press the first field on the screen to display or modify the buzzer configuration.



1	Buzzer on or Buzzer off configuration
2	Buzzer frequency configuration

Return to the previous screen "System settings".

Press the fourth field "Intro screen" on the screen to display the configuration of the start-up information.

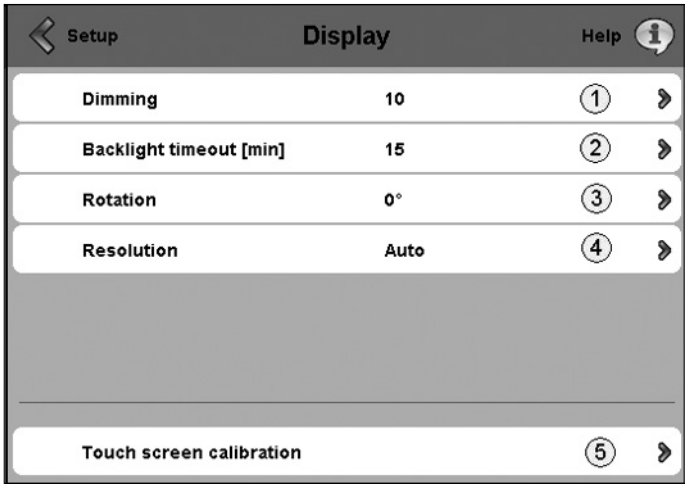


1	Welcome message at start-up of the application: Welcome
2	Display of the Carrier logo at start-up of the application

The default values are shown above.

18.5 - Display configuration (contrast, screensaver, calibration)

In the main configuration menu (see section 18.1) press on the "Display" field. The screen below is displayed.



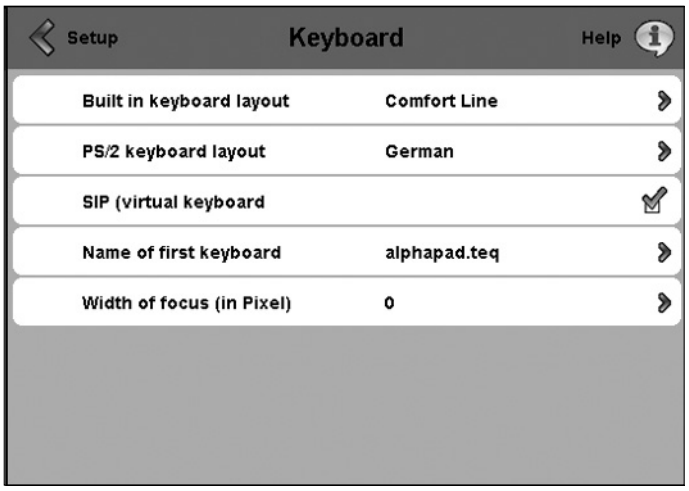
1	Contrast control
2	Time for the screensaver to be displayed. After the period defined the screen goes black.
3	Rotation of screen image
4	Resolution of the screen shot (do not modify)
5	Touch screen calibration

The default values are shown above.

18.6 - "Keyboard" menu

In the main configuration menu (see section 18.1), press the "Keyboard" field.

The default values are shown below and must not be modified.



18.7 - Password for access to the touch screen configuration

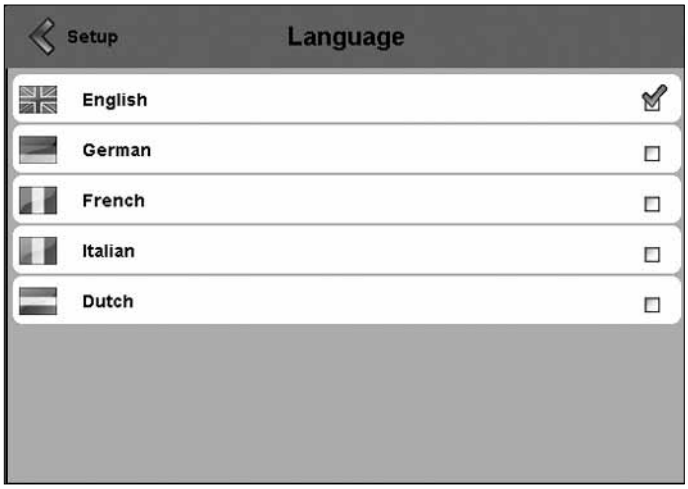
In the main configuration menu (see section 18.1) press the "Password" field.

Enter a password to protect access to the touch screen configuration.

18.8 - Languages available for the touch screen configuration

In the main configuration menu (see section 18.1) press the "Language" field.

Choose the language for the touch screen interface configuration menu screens.



The supported languages above are separate from the languages supported by the NSM application.

19 - NSM UPDATING

Before any NSM update, ensure that its hardware is compatible, using the table below. The factory versions of the hardware and software are shown on the label at the rear of the device.

Label at the rear of the device				**Upgrade of software version**				
Hardware version when leaving factory (HW)	**Hardware description**	**Software version when leaving factory (SW)**	**Software description**	**1.XX**	**2.XX**	**3.XX**	**4.XX**	**4.XX BACNet**
A1/A2	**Mother board with 16 MB** SDRAM Daughter board version B	NSM 1.XX		Yes	Yes	Yes**	Yes**	No
		NSM 2.XX	Carrier air handling unit	Yes	Yes	Yes**	Yes**	No
A3/B	**Mother board with 32 MB** SDRAM Daughter board version B	NSM 2.XX	Carrier air handling unit	Yes	Yes	Yes**	Yes	Yes***
	Mother board with 32 MB SDRAM Daughter board version B 1 GB SD FLASH installed	NSM 3.00 NSM 3.10	Carrier air handling unit Trending curves Energy metering E-mail	Yes	Yes	Yes	Yes	Yes***
A3/C	**Mother board with 32 MB** SDRAM Daughter board version C 1 GB SD FLASH installed	NSM 4.XX	Carrier air handling unit Trending curves Energy metering E-mail BACnet option***	N/A*	N/A*	If > NSM 3.10*	Yes	Yes***

* The A3/C hardware version is not compatible with the old software versions 1.XX/2.XX /3.00/3.10.

** The NSM is not equipped with an SD Flash card. However this card can be installed on site inside the NSM in the support provided for this purpose (the SD card of the industrial range has been qualified and formatted for use with the NSM – contact ERCD to find out the reference number for this product).

*** The BACnet option is available as an SD card (contact ERCD to find out the reference number for this product). This card can be installed on site. Once installed, downloading the software upgrade makes the BACnet option available.

20 - TROUBLESHOOTING OF OPERATING PROBLEMS

20.1 - Material problems

Symptoms	Possible causes	Checks to be made	Solutions
The NSM does not respond to the instructions sent by the supervision PC on the CCN Chiller bus.	Problem at the RS485 converter level of the PC or connection problem on the primary CCN bus.	Check the CCN cable connections. The CCN address of the NSM is 0.65 and the communication speed is 9600 baud by default.	Activate the line end resistance at the NSM by positioning the switch on the side opposite to the chiller RS485 connector. Replace the RS485 connector.
Communication problem when connecting the two buses (primary bus and secondary bus)	Electrical problem between 0 V CCN of the primary bus and 0 V CCN of the secondary bus.	Check the connection of the metal part of the NSM casing to earth.	Connect the metal part of the NSM casing to earth.

20.2 - Problems with the use of the web interface

The intranet site address of the NSM is the IP address.

NOTE: The NSM cannot automatically obtain the network parameters via an DHCP server.

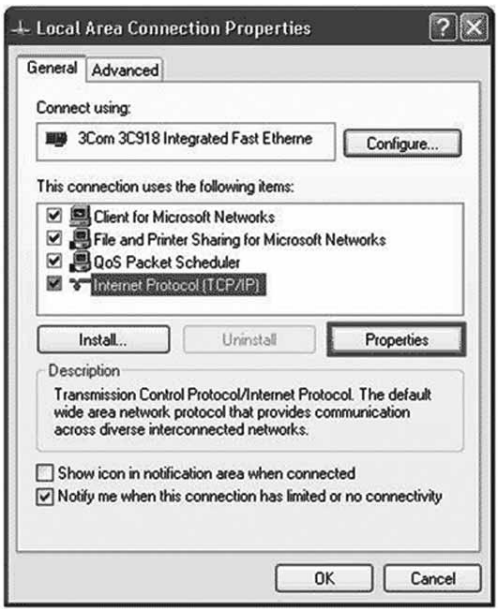
Symptoms	Possible causes	Checks to be made	Solutions
Loading of the NSM start-up page, then fault.	NSM property details not valid, Ethernet network not available.	Check the network parameters of the NSM. Check for flashing of the orange LED on the NSM.	Contact your system administrator. Check the Ethernet connection to the local network, if the orange LED does not flash.
While accessing the NSM via the web browser, the Java platform launches, but remains blocked. No file is loaded.	Proxy server problem in the local network.	Contact your system administrator.	In agreement with your system administrator open the RunTime Java control panel and select "direct connection" in the system parameters and/or request in the web browser (Tools -> Options -> Connection -> System parameters) that no proxy server is used to go to the local addresses. If possible untick "use of an automatic configuration script"). Restart the web browser.
The application has been launched, but the screens are not shown in the web browser.	A proxy server is used to access the NSM and this supplies the old screens to the browser. Bad configuration of the Java application.	Check that the web browser does not go via a proxy server to access the NSM.Check that the Java application does not store the internet files on the PC.	Open the browser and in the system connection parameters add the IP address of the NSM in the proxy exceptions. (Tools -> Options -> Connection -> System parameters -> "No proxy for"). See section 18.2.1.4.

20.2.1 - Ethernet/IP coonnection problem

20.2.1.1 - The NSM is point-to-point connected to a PC

The cable can either be crossed or uncrossed. The NSM is energised.

It can also be necessary to check the Ethernet connection and/or carry out the PC network board configuration (see 20.2.1.3).



Click on the "Properties" button of the internet protocol.

- If no IP address is configured in the "General" and "Alternative configuration" tabs, the IP address of the NSM must be configured to 169.254.xxx.xxx. Modify the IP address of the NSM and then restart.
- If the PC has a fixed IP address configured in one of the two tabs "General" and "Alternative configuration", the IP address of the PC and the IP address of the NSM must have the system and sub-system fields in common.

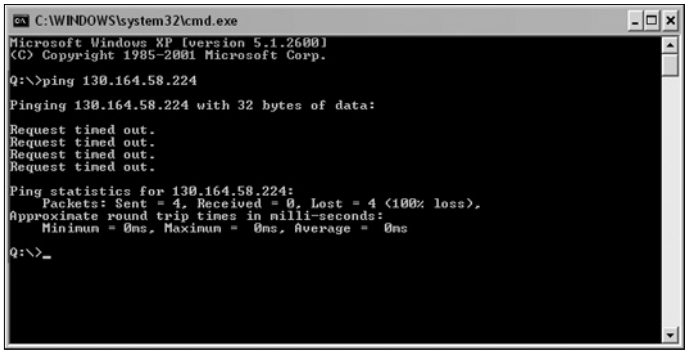
The last part of the IP address is the host number and must be unique on the sub-system.

For example:
NSM address: 172.30.101.11 and PC address: 172.30.101.182.
In this example 172.30 corresponds to the network and 101 corresponds to the sub-system.

Carry out the necessary modifications and try to access the NSM again.

In case of a problem open a command window under Windows (Start, Execute, type "cmd"<Enter) then type the command "ping" followed by the IP address of the NSM.

In the screen above the PC receives four positive responses.



In the screen above the PC receives four negative responses.

If the PC receives four negative responses, check the internet browser parameters to determine if a proxy server or an automatic configuration script has been configured. If this is the case:

- deselect the proxy server or the configuration script and restart the browser,
- or refer to the section about the configuration of the Java application (see 20.2.1.4).

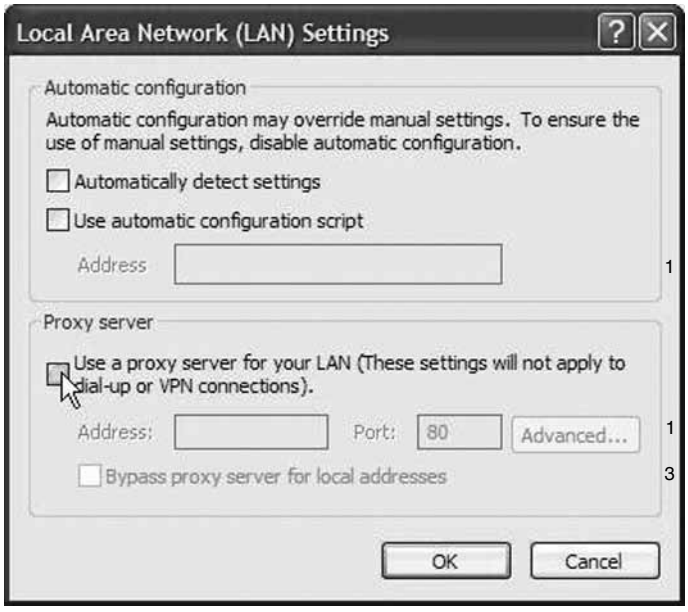
Try to access the NSM again. If the PC still does not receive a response from the NSM, restart the NSM. Contact your system administrator.

20.2.1.2 - NSM connected to the local network.

The NSM is energised. The NSM is connected to the local network by a uncrossed cable and the NSM is energised.

Open a command window under Windows (Start, Execute, type "cmd"<Enter), type the command "ping" followed by the IP address of the NSM.

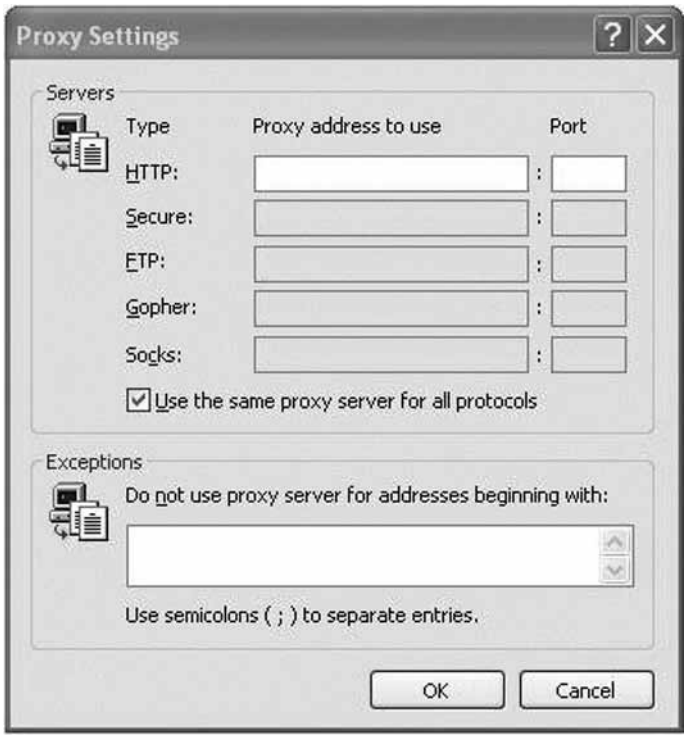
- If the responses are positive the problem comes from the internet browser configuration. Check the system parameters of the internet browser to determine if a proxy server or an automatic configuration script have been configured. (to Tools --> Internet Options --> Connections --> System Parameters).



Legend

1 Automatic configuration script
2 Proxy server
3 Advanced proxy configuration

- If a proxy server is used add the IP address of the NSM to the exceptions list of the proxy server (advanced proxy configuration).



If a configuration script is used, it is not possible to add the IP address of the NSM to the exceptions list. Refer to the section on the Java application (see 20.2.1.4).

If the response to the "ping"commands is negative, please verify the IP address of the PC and the IP address of the NSM. They must have the system and sub-system in common.

The last part of the IP address is the host number and must be unique on the sub-system.

For example:
NSM address: 172.30.101.11 and PC address: 172.30.101.182. In this example 172.30 corresponds to the network and 101 corresponds to the sub-system.

20.2.1.3 - Check the Ethernet connection on the PC

- Open the configuration panel of the PC and double-click on Network Connections.
- Find the system interface board and check that no red cross is shown on the icon.

The connection to the local network must be authorised and in the connected status. If this is not the case, check the connections and authorise/repair the network connection.

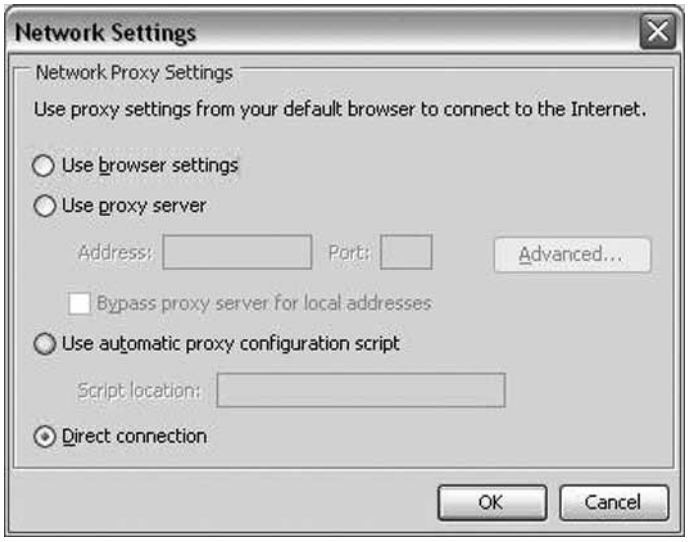
20.2.1.4 - Configuration of the Java application

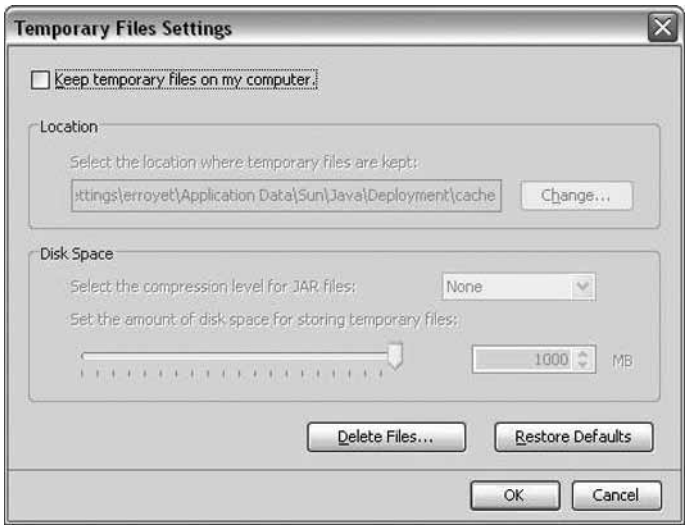
Open the configuration panel and double-click on the Java application Java icon. If it is not there, it must be downloaded from http://www.java.com (free).

If the Java application is there, ensure that it is not used by other applications. If it is, please check the compatibility of the following configuration with these.

Click on the system parameters, select a direct connection to bypass the proxy server or the automatic configuration script.

Java Control Panel
General
Update
Java
Security
Advanced
About
View version information about Java Control Panel.
About...
Network Settings
Network settings are used when making Internet connections. By default, Java will use the network settings in your web browser. Only advanced users should modify these settings.
Network Settings...
Temporary Internet Files
Files you use in Java applications are stored in a special folder for quick execution later. Only advanced users should delete files or modify these settings.
Settings...
View...
OK
Cancel
Apply





Click on the temporary internet file parameters and do not store these on the PC.

20.2.2 - E-mail transmission problems

- Verify that the IP address of the NSM is valid and that a PC browser permits displaying the pages.
- Verify the subnet mask.
- Verify the IP address of the gateway.
- Verify the IP address of the mail server.
- If the e-mail address specified in the field "Sender" is not a valid address, it may be rejected.
- Verify the e-mail address(es) of the recipient(s).
- The server may require an authentication.

20.2.3 - Functional problems

Symptoms	Possible causes	Checks to be made	Solutions
A value has not been accepted.	The entered value is outside the limit values. The decimal separator used is the comma and not the point.	Refer to the item description to find the limit values.	Re-enter a value between the low and the high limit value. Use the point as the decimal separator.
The unit setpoint is not the setpoint of the zone to which it belongs.	The setpoint has been modified directly at the unit level. The setpoint has been updated with the summer/winter setpoint, if this mode is active.	Check to which zones the unit belongs and what the associated setpoints are. Check if the summer/winter mode is active.	Modify the unit setpoint directly or save the zone setpoint. If the summer/winter mode is not required, deactivate it.
After a delay of approximately 5 minutes the NTC returns to the unoccupied mode (replacement of an old SM model by an NSM).	Configuration of NTC digital input 2 for the presence detector.	Check this NTC configuration in configuration table TCCONFIG.	Place this value at 8 global input).

Order No: 18365-76, 07.2012 - Supersedes order No: 18365-76, 07.2011
Manufacturer reserves the right to change any product specifications without notice.

Manufacturer: Carrier SCS, Montluel, France.
Printed in the European Union.